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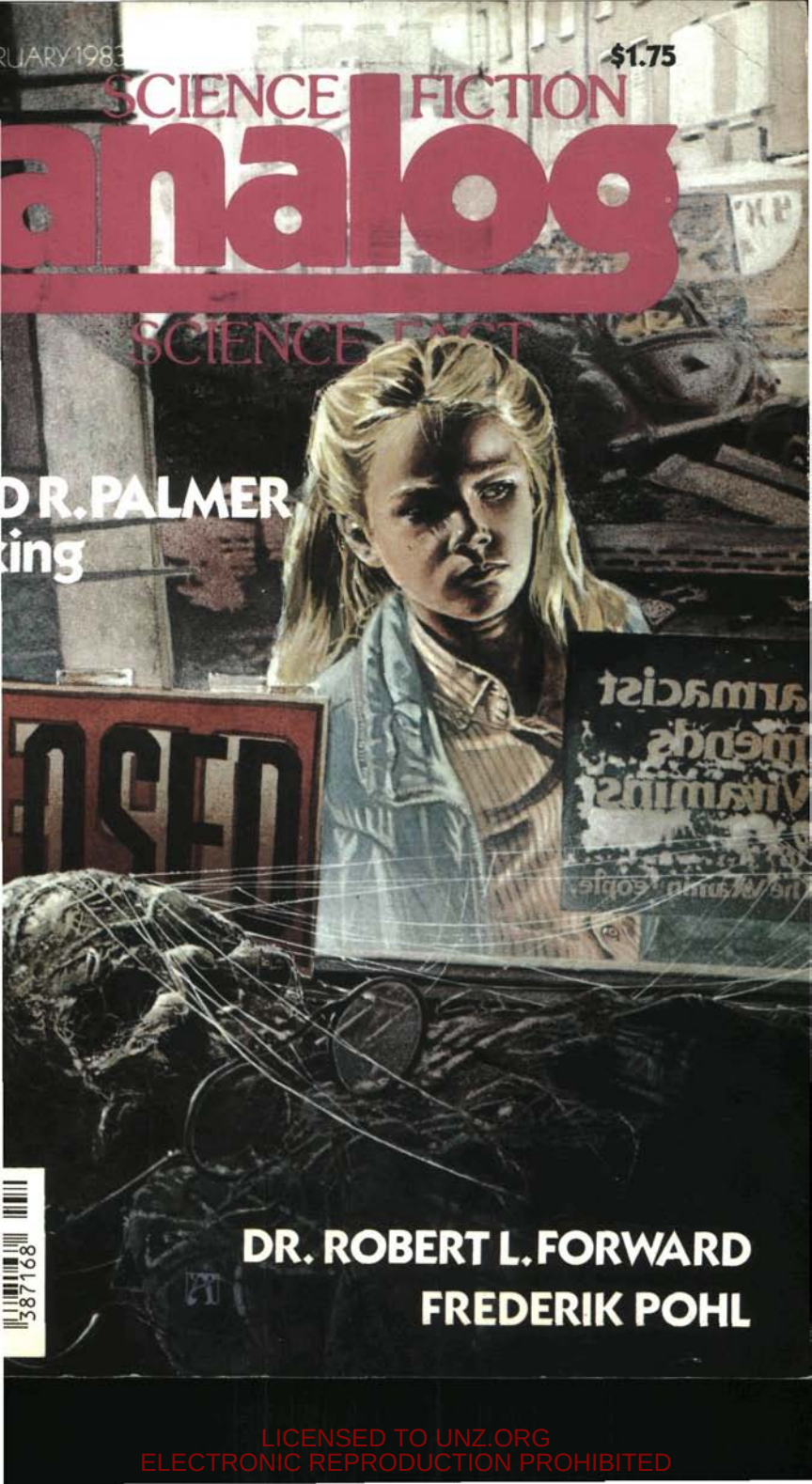

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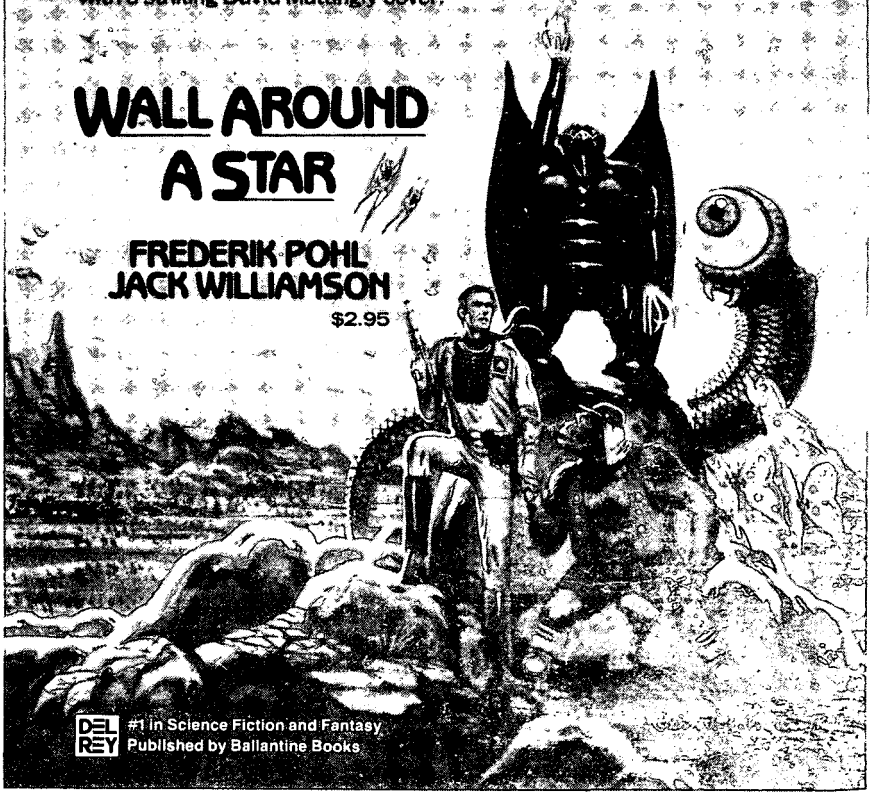

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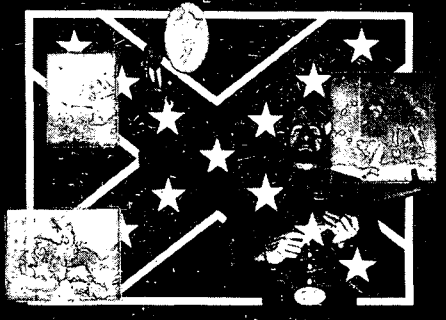

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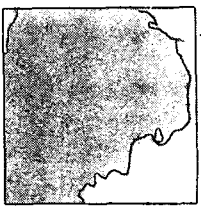

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Editorial

A Journal of (Dubious) Distinction

by Stanley Schmidt

Last month I spoke here of the reasons why most stories, scientific theories, and such are never published. To summarize briefly, the space available in the existing organs of publication is so much smaller than the volume of material being produced that most of it simply *can't* be accommodated, even if it has some merit. This fact has its unfortunate side because, while much that languishes in obscurity deserves to, some of it deserves exposure—and "The Establishment" needs to be challenged occasionally, if only to expose its weaknesses and reconfirm its strengths.

So where can the person with an offbeat idea—be it a reactionless drive, astrological weather prediction, or a scheme for an anarchical society—go to publish his thinking or experimental results? In most cases he will not be able to get into the standard journals of science; they must screen, to the best of their ability, according to standards which their subscribers expect them to uphold. He may be able to get into *Analog*—but our capacity is very limited,

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and there are standards (though somewhat different ones) which we must insist on, too. There remain, it seems, few alternatives except to publish his own work, either by buying or hiring his own facilities or by using one of the "vanity" book publishers. Both of those options are expensive, vanity books tend not to be taken seriously by people who know what they are, and many ideas don't require a whole book anyway.

So what's a poor "crackpot" to do?

Having spent my last column explaining the problem at considerable length, in this one I'd like to offer a partial solution. It occurred to me while typing "Those Nasty Ol' Censors" that John W. Campbell, back in 1964, proposed an idea for use in a different area which, with some modification, might be adapted to this one.

Campbell's idea was to systematically license medical quacks—*as* quacks. My idea is to establish one or more journals specifically for crackpot theories and experiments.

Sound crazy? Campbell made a pretty strong case for his proposal. I'm not going to get into all the details of his rationale and how his system would operate; if you haven't read them, you can do so in our June 1964 issue (or the Doubleday collection of Campbell editorials edited by Harry Harrison in 1966). Basically, his contention was that, since many important medical pioneers initially were considered quacks, and since orthodox medical treatment *cannot* cure certain problems, those patients who can't be helped by orthodox methods should be free to play long shots and try unorthodox practitioners who claim *they* can help. The patient has little to lose except money, and if quacks must be clearly labeled as not approved by the medical "establishment," the patient is amply warned of that risk. Meanwhile, the carefully monitored records of the licensed quacks form a large pool of original research which may occasionally yield something of value. Those quacks who get poorer results than conventional medicine are shut down; those who do better are studied to learn how they do it.

My proposal is similar in spirit if not in detail. Somewhere among the papers which the standard journals reject, for whatever reasons, may be some nuggets of truth which deserve to be developed. If enough of them are seen by enough people, those with potential may eventually be picked up by someone with the interest and wherewithal to pursue them. By providing a special journal for such papers, we provide a mechanism for simultaneously getting them before the public and warning those who read them that what they are reading is *not* generally accepted science.

Note carefully: the intelligent reader is expected to keep in mind that publication in this journal is *not* intended to label their contents as *definitely wrong*, but merely *unorthodox*—and therefore requiring especially careful scrutiny. The hope of its success lies in the possibility that some scientists will be willing to spend some small portion of their time looking through such a journal to see if they find anything of interest. These scientists will recognize that most of their searching will be fruitless—but that when they *do* find something, it

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may be of exceptional importance. If *any* such concepts are found, the journal—like the licensed quack whose methods prove to work—will have justified its existence.

What shall we call it? *The Journal of Questionable Science*? *The Heretical Physicist* (or *Botanist, Psychologist,* or other specialist of your choice)? *Quack Quarterly*? *Proceedings of the American Institute of Psychoceramics*? How about *The Journal of Unpublishable Results*? Or *The Reject Review*?

Actually, there may already be (or have been) one or more publications which approximate at least slightly what I have in mind. My impression is that the *Worm Runner's Digest* and the *Journal of Irreproducible Results* did some of this sort of thing, though it is also my impression that they also published scientific whimsy and satire, and which was which was not always obvious. Unfortunately, I never had much opportunity for leisurely examination of either, so what I know about them is largely hearsay. I recently learned of a very promising journal called *Speculations in Science and Technology*, published in Australia, which is likely the closest thing yet to what I'm describing, but with some important differences. It has taken considerable pains to assure scientific respectability, through the use of more conventional editorial screening than what I'm about to propose; the result is probably a much higher percentage of worthwhile articles, but fewer *extremely* far-out ideas. It also is funded differently; at this point, I'm not completely clear on who publishes it or where the money comes from.

My *Journal of Questionable Science (JQS)* would, ideally, be generally known and widely accepted among scientific professionals for what it is. To avoid the problem of readers having to guess whether a particular article is serious speculation or spoof, it would at least *try* to restrict itself to the former; but it would have much less editorial participation than *SST*.

Perhaps the best way to achieve these aims would be to have *JQS* (or several such journals, in different fields) published by one or more existing and respected scientific societies. If, for example, the American Institute of Physics added such a journal to the list already under its auspices, its inclusion in that list would tell physicists that this is not just a joke by some unknown prankster, but a real attempt to explore some of the fringes of science in a way not being done elsewhere.

It is doubtful that many members of AIP would want much of their dues money used to finance such a journal, so how would it be funded? In essentially the same way as most other professional scientific journals: by the payment of page charges. It may come as a shock to some would-be contributors, but most scholarly journals, far from paying the authors who appear in their pages, routinely ask the authors (or their employers, if any) to pay a fixed amount per printed page to help defray the costs of publication. *JQS* could do the same. Since it would probably encounter considerable resistance among the membership, at least initially, *JQS* would probably not be able to offer the option (as some other journals do) of waiving

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page charges for authors who are unable to pay (with the understanding that failure to pay will cause a long delay in publication). Except for such support as can be obtained from subscription revenues and possible donations, *JQS* authors will have to bear the whole cost of publication themselves—and since subscription revenues are likely to be low, page charges are likely to be somewhat higher than in other journals. Even so, they should be appreciably less than vanity publication of a whole book, since most authors only need a few pages and all are sharing the use of the sponsoring society's existing machinery for journal publication. So while *JQS* doesn't provide a free ride for everyone, who wants to say something, it *does* make it a lot easier—and most "establishment" scientists don't get a free ride, either.

Wouldn't having *JQS* published by an established scientific organization lead to suppression of the very kinds of papers it's supposed to specialize in? Not if it's done right. Selection of contents—and I say yet again, selection is unavoidable, even here—will *not* be on the basis of scientific merit. This journal is explicitly reserved for articles whose merit is not obvious to the usual decision makers. Its editors might even require proof of rejection by all other potentially appropriate journals before they will consider a paper for *JQS*. Their sole editorial function (other than copy-editing and proofreading) is to screen out the really obvious pranks and hoaxes —which means that the really clever ones will sometimes slip through. So be it; that's inevitable, and the title, like a quack's shingle, warns the readers that that's more likely to happen here than elsewhere.

So how *do* the editors decide what to print? Except for obvious gags, quality is not a consideration; the whole object of the exercise is to make this one place

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where the readers are completely on their own to judge that. Nor should the criterion be monetary: no one should be able to buy his way into *JQS* by offering a supporting donation in excess of standard page charges. *JQS*, ideally, should operate with neither profit nor loss; every contributor pays his fair share of "break-even" operating costs, and none can buy special consideration by offering more. I suggest a lottery: we literally draw manuscripts from a hopper and print them until the available pages are filled. We could even adopt the system, legendary among students on every campus, of throwing submitted papers down a flight of stairs and seeing where they land!

If it works, occasionally this system will produce an idea which, exposed to the light of day, will strike sparks which lead science in directions which orthodoxy might not have found on its own until much later—if at all. And in such cases, what positive reinforcement might we offer the oddball scientist whose idea has proved itself? How about waiving page charges on his next article? The guy who has had one good idea has shown a better-than-average potential for coming up with another. He paid for the first one; since it paid off, let's reward him with one free chance to do it again. If that one pans out, too, he can have another—and if he's really good, he may never pay another page charge. If he's that good, he's *worth* supporting. The subsidies for the successful can be budgeted right into the operating costs—probably with very little effect on page charges.

Lots of variations are conceivable, of course, and it might be worthwhile to have several of them running concurrently. For example, heretical scientists could form their own society and publish their own journal. This would have the advantages of eliminating any suspicion of suppression by the Sponsoring Orthodoxy and encouraging mutually stimulating dialogues among the membership. It would have the disadvantages of appearing more suspect to the "establishment" scientists the members would like to have reading the journal, and requiring higher page charges because a new publishing operation would have to be set up from scratch. Ya pays yer money and ya takes yer choice. Personally, I'd really like to see one or more of the existing societies support something like this, but if somebody else wants to do it too, that's fine with me.

Either way—or both, or some other—it would be an interesting experiment to try. It wouldn't cost anybody except those who participate—and, once in a great while, it just might give us something we all need. ■

● Celestial navigation is based on the premise that the Earth is the center of the universe. The premise is wrong, but the navigation works. An incorrect model can be a useful tool.

Kelvin Throop III

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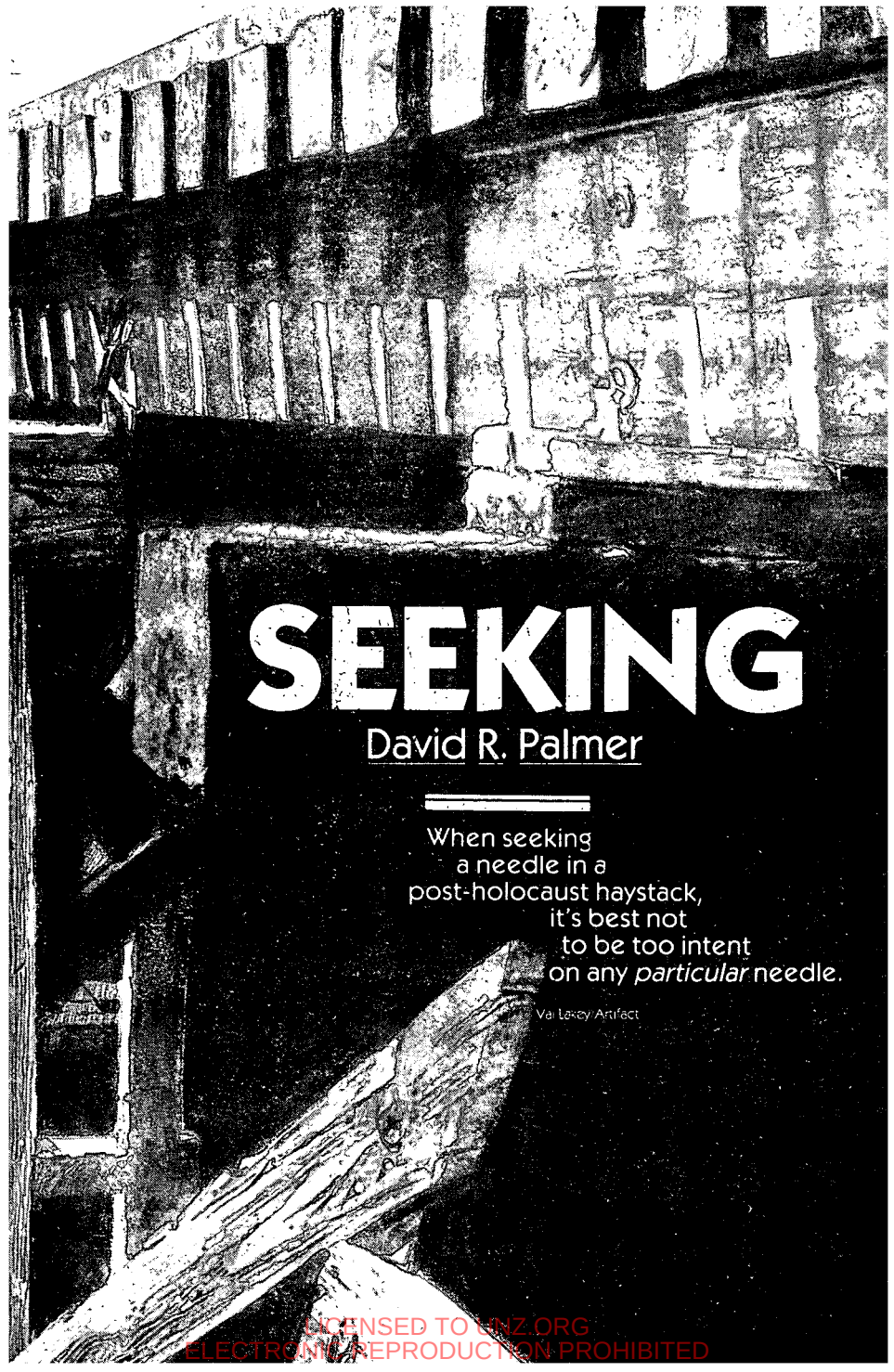

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Hi again, Posterity. Happy to see me? Or just surprised? Wish could be happier to see you. Should be, of course, and perhaps one day will be again. But just now view prospect of commencing this record with less than enthusiasm.

Appreciably less: Present overdue status not question of mere sloth, inefficiency; delay is product of sober consideration, sound reasoning. Entirely deliberate: been stalling.

But before condemning dilatory scribe out of hand, please attend, one, all; explanation follows, to wit:

Scared. No, not shaking-in-boots scared, not blood-turns-to-cottage-cheese scared; more an ominous-disquiet scared, two shivers qualmier than knock-on-wood scared. Leery of tempting fate.

See: Commensurate with tenacious optimism expected of journeyman-grade Pollyanna, intend this record (together with previous journal [Vol. 1], plus all subsequent memoirs) for study by, ultimate benefit of, future generations—if any—tended in respectful, unhurried fashion by historians, students, archeologists in suitably dignified setting: Smith-Foster Post-Armageddon Historical Library & Archives.

Fond aspirations envision *lots* of subsequent volumes, eventually amassing truly impressive collection covering very long timespan; accumulated in orderly manner by Library courtesy of Yours Truly through regular donations, personal delivery. (Key words here are *regular* and *personal:* want no gaps—and especially don't want final volume dropped off by unwashed, travel-weary, buckskin-clad, intrepid explorer-of-unknown, plucked from God-knows-where.)

Foregoing tidy scenario intrinsic to present emotional well-being; implying, as does, long-range goals; own demise postponed many, many years hence; arriving (if ever) long after achieving revered status as beloved silver-haired, *old* counselor; authentic sage, oracle *senectutis causa;* expiring gracefully in own bed amidst tearful mob of properly devoted descendants, admirers.

However (follow logic closely now): longer journal commencement deferred, longer am able to ignore alternate possibilities—perhaps even probabilities—that impending events may interrupt record mid-chapter. Even mid-sentence. Until begun, this volume cannot be last in series. (Cannot be discovered incomplete amongst own bones somewhere on depopulated planet.)

Which is uncomfortable notion at best. Much prefer waiting until events justify more positive outlook, reasonable expectation of survival, living Happily-Ever-After.

(Curious behavior, must admit, for certified genius.)

However, personal problems are no excuse to compromise record; responsible histographer must face darkest prospects squarely, do job. True, this journal meant for proper delivery to proper audience; and if such be assured, could be prepared as well after the fact, at leisure, as minor adjunct to activities comprising Happy Ending. But if not—assuming worst: found under grisly circumstances by fellow involuntary ragtag explorer—even he entitled to complete account, within limits imposed by conditions.

Not least of which: very real doubt typical Bold Wanderer able to decipher

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Pitman Shorthand. But would *be* no record in longhand: so inefficient, agonizingly slow; results bulky, burdensome to carry. Besides, not my problem: shorthand system identified on cover, together with author, subject matter. Texts available at any library (most should stand, protect contents for centuries). My notes clear, straightforward; without unusual briefs, nonstandard phrase linkages. Given time, motivation, legible to anyone.

And must demand *some* effort from Posterity (regardless of whom may consist). Being furnished, after all, valuable detailed information on End of World. Not available at every corner newsstand.

As may be.

Peter Bell trustworthy, reliable, responsible (according to Tarzan File—along with brilliant, sensitive, witty, handsome). Distinctly not sort to ignore constantly ringing phone. Or 50 messages on answering machine. To say nothing of known damsel (distress or otherwise quite immaterial; evidence suggests ain't many of us). Would have returned call had been home, gotten message. Since didn't, wasn't.

Certainly. I knew that.

But human—pardon, mean *Homo post hominem*—psyche surely most perversely useless corner of entire mind. Unreasonable beastie, downright illogical. Makes no sense at all for naked-eye confirmation of months-ago deduced fact to precipitate funk.

Move-out deliberate, unhurried, thorough; signs unmistakable: Doors, windows neatly shut; closets emptied, personal effects removed; utilities switched off at fuse box. Obviously had business elsewhere; went; had ample time to. Nothing about absence to create ominous doubts, assumptions, speculations. Simply moved. Period.

Granting which, enigma remains: Candidia Maria Smith-Foster, superkid, prize intellect in or out of research project—coldly analytical, logical, rational, etc., etc.—agitatedly pacing through Peter Bell's empty house; repeatedly peeking into empty closets, endlessly ransacking empty drawers; playing back empty answering machine tape over, over again; wringing hands, streaming tears, sniffling, blubbering—

For almost three solid hours. . . !

Disgraceful performance: behaving like maiden forsaken at altar. Atavistic. No justification.

Terry endured in relative silence, occasionally moving from one shoulder to other, shifting weight, intermittently shrugging to settle feathers. Comments limited to single low whistle when we entered obviously vacant premises, occasional "How *'bout* that" as time passed. No doubt embarrassed for me.

Wait. *No* justification?

Correction, please: Atavistic, true, but partially justified. . . .

Justified.

Entirely justified.

Justi-damn-fied all to pieces!

Why *not* upset? Months of hopes, anticipations, expectations; long, hard trip—for *nothing!* Nary a clue—not even faintest hint remains to suggest destination, whereabouts.

Some superman! Inconceivable could go off without leaving note—self-respecting five-year-old *human* would expect me on doorstep eventually, (if alive), leave forwarding address.

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But perhaps being too harsh. . . . Should take comfort instead from apparent discovery that certain fundamental behavioral principles transcend interspecies gulf; continue unchanged, intact, eternal; intrinsic to new race as was old. Datum no doubt scientifically fascinating in own right; of great satisfaction to researcher. But frankly, until now never troubled head over whether new species might boast thoughtless, self-centered, imbecilic male *twits!*

Oh, dear. Just look—ink hardly dry following wallow through well-intentioned (if debatable) solicitude for plight of hypothetical NonScheduled Reader (NSR) and already hip-deep in tirade comprehensible *only* to proper audience. So sorry; will try to do better. Really.

By now NSR probably wondering what *H. post hominem* might be. Or Tarzan File. Or perhaps who Peter Bell is. Or Terry. Or (at very least) me.

All right. Fair questions; deserve straight answers. So shall endeavor to bear in mind possible audience other than intended: fellow survivor, perhaps—but demonstratedly better at it—someone lacking vantage of orderly progression from Vol. I (in shelter library beneath address on cover, Index No. 1.1.1).[1] Viewed in that light, however reluctantly, introductions are in order:

Name: Candidia Maria Smith-Foster. (Note: Nothing "sinister" about "bar"; used here proudly to honor adoptive parents together with kin.) Born eleven years ago to Smiths; orphaned ten months later; adopted by Dr. and Mrs. Foster—"Daddy" and "Momma." Been known as "Candy" since first breath.

Beyond that (briefly): *Homo post hominem* is new species; originating during great influenza pandemic of 1918-19 through viral recombination of unborns' genes; apparently immune to all "human" disease, plus smarter, stronger, faster, etc.; discovered accidentally by researchers headed by Teacher (next-door neighbor, genius), aided by Daddy, while hunting for clues identifying genius-level children as newborns; emerging to inherit Earth after *H. sapiens* eliminated selves in short, efficient, bionuclear war. Tarzan File is Teacher's record of said research; identifying, profiling, locating all known hominems. Peter Bell is *H. post hominem* associated with Teacher's research project; very smart, closest of project hominems to own age; recommended for future by matchmaking Teacher in letter which constitutes Last Words. Terry is own adopted twin brother (full name Terry D. Foster—initial stands for Dactyll); identical but for mental retardation and being hyacinth macaw. Am myself *Homo post hominem*. Rode out war in Daddy's marvelous shelter; now engaged in walkabout, searching for fellow survivors. Of which reader must be one.

There. Clear enough?

No? Complaints—from NSR? Too brief? More confused now than before explanation? Some *nerve!* If reader truly nonscheduled, then writer almost certainly *dead. . . !*

Wait, please don't sulk; surely can't

[1] *Also published as "Emergence," Analog, January 5, 1981.*

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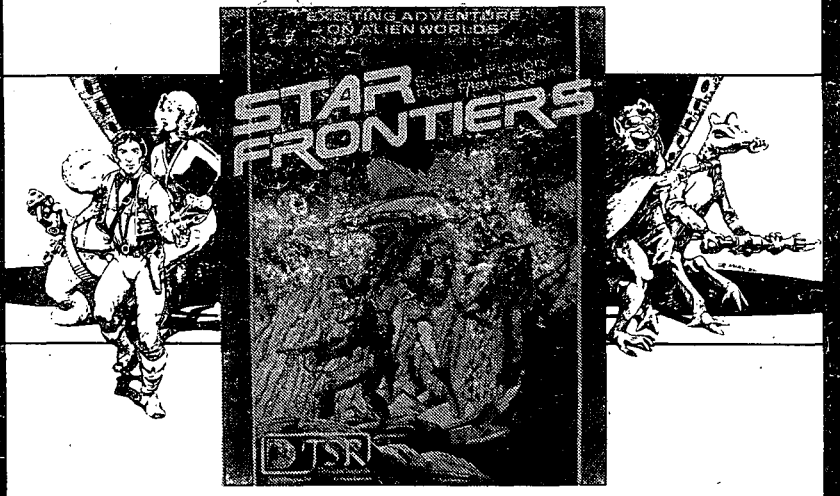

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expect sympathy from corpse—should be grateful for simple courtesy. . . .

Oh, all *right*. . . ! More background then—but within limits; full details in Vol. 1.

Daddy was pathologist; also government germ warfare consultant (coping with "theirs," not developing "ours"); likewise key member of research project originally seeking clues enabling early identification of truly gifted children, providing accelerated educational opportunities fully utilizing capabilities.

Group headed by Soo Kim McDivott, Chinese-American born during Boxer Rebellion days. Awesome intellect, all-around incredible person: Ph.D.s in pediatrics, psychiatry, anthropology; Tenth Degree Master of Karate; compulsive teacher. Had developed theory: Environment possibly more critical than heredity in achieving full potential; i.e., subnormal parents producing genius child may limit child to own level, for whatever reason, through whatever mechanism. Collected thousand-plus case files demonstrating that children raised by animals, upon reaching certain age before returning to "civilization," fail to exceed adoptive "parents' " intellectual levels. Interested government money-men, attracted colleagues, commenced research.

Were first successful, then stunningly *beyond* successful—discovered new species masquerading amidst humanity: *Homo post hominem*, mutation apparently rooted in fact that grandmothers all conceived during 1918-19 flu pandemic; subsequent genetic convergence assembling complete new genetic structure by third generation. Characteristics include greater intellectual potential; enhanced sensory capabilities (vision well into infrared, U.V., etc.); physical superiority (stronger, quicker reflexes, apparent immunity to full spectrum of human disease, probably longer lifespan, etc.).

Fosters soon recognized own new baby precocious. Reactions varied diametrically: Daddy wanted fluffy baby girl, full of "sugar, spice," etc. Momma disagreed but avoided direct confrontation; quietly went ahead, did full-time level best to teach as much, as fast as could absorb without stress.

Situation static until Daddy tumbled to fact own little girl *H. post hominem*. Worse—more advanced for age than group's experience with hominems indicated had any right to be. Mystery.

Conclusion (tentative): Whipsaw upbringing (spoiling/pushing) somehow combined, reinforced; kindled in me hunger for knowledge surpassing even that burning within carefully orchestrated study group AAs.

(Regarding whom: Project consisted of two hominem groups: AAs, ABs. AAs benefited from unlimited tutoring, best possible education, paid for by government grant, with enthusiastic cooperation of parents. ABs fated to be controls [harsh scientific reality: *somebody* must]: Identified hominems raised normally by parents unaware of status, potential. [Originally AAs, ABs not synonymous with hominems but discovered within study's genius population; then sapiens AA, AB children separated from original project, which thenceforth focused upon hominems only.] AA hominems, of course, progressed phenomenally. ABs rarely exceeded national norms, but included

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among numbers disproportionate collection of emotional cripples, maladjusteds, anti- and asocials, plus very occasional AA-level genius. Generally AB population's symptoms suggested frustration, repression, minds gasping in intellectual vacuum.)

Then at five—disaster: Momma died, leaving "saw" without "whip." Leaving me half orphan (again), but not traumatized; Momma knew in advance; prepared me well. Missed her when gone; hoped having good time in Heaven.

But before died: conspired with Daddy, Dr. McDivott (known by most as "Teacher," except when teaching karate, when addressed by *all* as "Master") to continue my education, same basis as before: Teacher to "retire," move in next door; continue "whip" while Daddy "sawed."

Further, to pass time when not working with me directly (probably not easy for septuagenarian to focus energies previously absorbed by three full-time professions, one full-time research project, on no more than covert tutoring of single small child), Teacher established karate classes at YMCA; providing opportunity to work with other children in town, subliminally teaching *learning* while openly instructing martial arts. Little effort required to maneuver me into joining. Was apt pupil: ten months to Black Belt; state championship (age/weight class) six months later. Achieved Sixth Degree, youngest in world, even before . . .

Before *Ragnarok*—war *really* to end all wars: suicide of *Homo sapiens*.

Originally regarded own survival during missile exchange, subsequent contagion period, as pure coincidence: rode out active phase 200 feet underground in Daddy's shelter, sealed inside yards of lead, concrete, etc. (Had taken illicit advantage of Daddy's absence [went to Washington, war scare conference —appropriately, as turned out, but late] to explore vast library therein.) When instrumentation detected radiation wavefront, shelter sealed automatically. Then couldn't figure out egress mechanism; spent best part of month trapped—missing thereby opportunity to breathe man-made pathogens while still virulent.

Not until located Daddy's secret file detailing government role (in which also found shelter operations manual) did escape become possible. But quick read-through of documents concerning biological arsenals poised on both sides—and now at large—cured impatience. Waited additional two months to ensure infection phase truly over before showing nose outside.

Shortly thereafter found *Teacher's* secret papers (code name Tarzan File), to which affixed detailed letter — addressed to *me*—explaining contents, from which learned details of own genesis, characteristics: would have been immune regardless.

. . . if not killed outright by blast, heat, radiation. But according to Daddy's papers, bomb use limited to triggering previously seeded virus. Detonated very high; insignificant blast damage; little heat, briefest radiation.

Just enough to wake Doomsday Bugs.

And two, three days later—no more *H. sapiens:* greatest species—deadliest predators, cleverest builders, gentlest philosophers ever to roam planet—*gone*.

Leaving me—at age 11—to contem-

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plate with sudden new awareness chilling depths contained in heretofore commonplace adjective, "alone."

(Though not technically completely alone; and responsibility doubtless saved life [sanity, certainly] during weeks following attack. Truly believed Terry own twin when very young. Disabusal traumatic; his flying, my not, presented serious adjustment crisis [eventually resolved]; and relationship now symbiotic in truest sense: I provide food, shelter, protection, hugs, head rubs; he contributes companionship [believes nothing is right with world, nor is God in His Heaven, unless able to spend every waking moment on my shoulder, watching, "helping"], conversation/comic relief [twin's name is legend amongst devotees of art of malapropism], optimism [outlook gives new meaning to adjective "manic," never mind "enthusiasm"], perspective [impressed by nothing; inevitable response to triumph, tribulation, everything between, is, "How '*bout* that . . ."], humility [regards all artifacts as personal challenge; derives purest demonic glee from testing, with uniform success, great clam-shell beak—1,500 pounds closing pressure—on anything within reach], emotional security [loves—*needs* me].)

Tarzan file listed names, addresses of all known AA, AB hominems. More specifically, Teacher's letter referred me to one Peter Bell—AA superkid, smart as me (intimated might be smarter; hurled gauntlet to prove him wrong). Predicted was best prospect of lot for future soulmate. Had told him about me. Suggested I get in touch.

Now, current scope of interest in "future soulmate" limited to practical matters: food, shelter, protection, survival—short-term essential stuff; deferring obvious racial continuity issue until puberty, completion of glandular development, make pertinent. (And probably unavoidable—have no valid basis to doubt will be just as tiresomely boy-crazy, once plumbing commences normal function, as next ingénue. But can *hope*.)

However, long experience (relativistic expression, of course, considering modest lifespan thus far) amply justifies habit of equating Teacher's least hint with Revelation From On High. Certainly adequate incentive to make attempt.

Phone system still functioning in many portions of country (according to aural evidence: ring tone obtainable using most area codes, random numbers); so tried number listed in Tarzan File.

No luck. True, answering machine camped on line picked up phone, spouted message for me; but Peter never returned calls.

For two and a half months!

(Oversensitive soul might, by this time, ponder reciprocity of interest. Might even [given modest encouragement] contemplate feeling neglected, unattractive; launch into spate of mouthwash, deodorant changes; file teeth, fluff nails, polish hair, etc., etc.)

Nonsense, of course. Endless possible explanations: Defective answering machine, talking but not recording; phone system itself finally disintegrating (not unreasonably: six months without maintenance—even in system based on hydroelectric power, with computerized call routing automatically divert-

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ing calls around trouble spots, time must come when trouble spots constitute *norm*, system collapses). Perhaps, too—certainly equally likely—Peter simply not home, for own good purposes. No more reason now to wallow in morbid speculation than during months since initial contact attempt frustrated.

Though, granted, too busy then to spare attention for proper moping. Not easy, in only two and a half months, to locate suitable farm convenient to Daddy's house (and shelter treasures beneath); catch up all chores necessary to improve chances that livestock, structures survive Wisconsin winter's ravages.

Nor did trip from Dairy State heartland to Peter's Cornell campus (New York State) residence provide much time to reflect unsettling possibilities, generally inequitable nature of life. Physical fragility of human civilization becoming evident after only six months' neglect: Road system in sorry state, getting rapidly worse. Trees down here, there; poles broken, lines draped elegantly in inconvenient places; surprising numbers of washed-out culverts, impassable bridges.

Four-wheel-drive Chevy van wonderfully capable, easy to drive—with lifts on pedals to accommodate own modest stature. High ground clearance, awesome traction make easy work of marginal terrain. Solved many blockages simply by driving around—through fences, across fields, small streams, up hill, down dale, etc.—but spent fully as much time on shanks' mare, cutting, prying, winching, digging, etc., as driving. (Educational travel mode: really get "feel" for countryside—feel it under nails, in shoes, tangled in hair, embedded in clothing. . . .)

Well, journal commencement, however belated, yielding usual result: hurt, rage, disappointment discharged on paper; blood pressure lowered, practical state of mind restored—along with perspective: crying over spilled milk null exercise; benefits neither spiller nor spillee.

Okay. So Peter Bell not here. Elsewhere. Gone. Now what?

Prime objective obviously unaffected; unchanged from very first day we stuck nose outside shelter following expiration of predicted maximum contagion factor after World Ended: Find *somebody else*.

Somebody smarter, bigger, stronger; with broad shoulders, laughing eyes, windblown blond hair; font of wisdom concerning all aspects of establishing bright new civilizations for fun and profit. (Be nice, too, if knows location of Yellow Brick Road.)

But Teacher's statistics project only 150,000 hominems on North American continent. (*Entire* continent—8,795,052 square miles [National Geographic World Atlas figures]). Another perspective, same problem: 58.63 square miles per person.

One solution: Rule off continent graph-paper style, in squares 7.6575 miles per side; pick square at random; stand at center; yell through bullhorn. Then repeat—150,000 times.

However viewed, awful lot of elbow room. Population spread terribly thin. Accidental meeting probability effectively zilch—which fact may, upon reflection, be disguised blessing. . . .

Don't really *want* to meet ABs; not

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until securely ensconced within bosom of AA community. Hate to sound prejudiced, but am; can't forget Teacher's opinion that majority laboring under some form of emotional problem, high percentage downright pathological. Not unreasonable, then, to assume every contact but AAs, absent convincing evidence to contrary, may be hauling unsecured payload—be potentially dangerous.

Which revives burning issue: Peter Bell not here; no hint of how long gone, where to. May even be dead—from available data, likely as not. Speculation pointless.

But I'm alive. Very much so. Firmly resolved to maintain trend. Ergo, logical next step: pick another AA from file. Doesn't matter which; only Peter Bell personally recommended, described. Others only represented by impersonal file entries. Okay, but faceless.

However, close to 100 AAs recorded, scattered all over U.S. No assurance any address still valid and random visits could take forever, or longer. Only reasonable procedure: Plot locations on map; lay out most efficient meander touching all bases, shortest time, distance—reserving, of course, right to fly off on wild tangent should events offer even most tenuous clue.

Intend just that. Tomorrow morning, though; not now. Tired. Disappointed. Probably still vexed, too, if had energy. Even Terry subdued—for him. Perhaps senses mood. Perhaps just bad day: too long, too many expectations. Too much letdown.

Never mind. Tomorrow is another day—Pollyanna *lives*. . . !

* * *

Good morning, Posterity! Night's sound sleep; huge, well-balanced, delicious breakfast (prepared by gourmet chef, with—or despite—intensive assistance of manic twin [laughing hugely, grabbing at everything in sight]) produced usual result: energy, optimism restored. Along with independence—who *needs* Peter Bell! Plenty of fish in sea; Tarzan File full of alternatives—or failing that, might well be more fun to go out, locate, stalk, capture indigenous AB buck in native habitat; then housebreak, domesticate, teach rudiments of coherent thought, civilized speech. Why not? Might work. (And if not, gently separate cervical vertebrae [to discourage kiss-and-tell; wouldn't want to acquire "reputation"], throw back, try again.)

True, simpler to find AAs, settle again into secure little-girl/student role; allow others to make important decisions, feed, clothe, house, protect. (Sometimes wearisome, being master of own destiny. Worse than being genius. Lonely, too. Need hug.)

Enough! Used up whole year's snivelling ration yesterday. Brace up chin! Square off shoulders! Forward *ho!*

So this morning, following breakfast, scrounged campus (carrying crowbar, sledge hammer; implements intrinsic, these days, to serious pursuit of scrounging trade); located large-scale U.S. map, plotted AA locations, connected with straight lines.

And discovered predictable trend: all grouped about top-line schools, leading research centers. Harvard, M.I.T., Johns Hopkins, etc., on east coast. UCLA, U. of California (Davis), etc., on west. Kansas State U., U. of Minnesota, U.

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of Colorado, U. of Illinois, U. of Chicago, etc., etc., about midwest. Plus AEC, NASA, JPL facilities all over country. Appears nation's recent progress muchly traceable to AAs. (Hope didn't also figure in downfall.)

Okay, so much for short-term strategy: hunt proceeds hence by-the-numbers.

But what about long-term? Good point. What if, at last, search comes up dry? As might . . .

Indeed—what *if* . . . ? Not most comfortable premise for dyed-in-wool Pollyanna to contemplate, but valid. Every coin has two sides. Rankest stupidity to ignore possibility might lose toss; fail to plan for exigencies lurking on dark side.

Very well. Reflecting as pessimist, grimly: wise to leave notes all over, wherever might stop, pass through, visit; wherever other survivors (of whatever stripe) might find. True, probably—*certainly*—come to attention of itinerant ABs. Can't be helped.

But so what? Candy Smith-Foster, youngest-ever wearer of Sixth Degree Black Belt, uneasy at prospect of meeting strangers? Even potentially dangerous strangers? Yes. (But pretty potentially dangerous own self; harbor no genuine doubts about ability to cope with aberrant behavior as necessary. *Will* reach peaceful understanding, accommodation with fellow survivors; *will* live in altruistic, gentle harmony with neighbors, whoever may be, whatever background. Or else.)

College utilities still working; administration building well stocked with modern communications media marvels: electric typewriters, photocopiers, etc. Convenient opportunity; shall take advantage, spend next few days here; compose most utterly bare-bones, boiled-down condensation possible: message to leave about countryside during travels.

Content giving pause. Should identify self—but within limits. (No point, for instance, mentioning age, sex, dimensions. Teacher's caution firmly in mind; well aware that whatever response in numbers, substantial percentage bound to be maladjusted. No point slanting advertising toward weirdos.) Should describe resources, advantages of hometown area, farms (omitting shelter mention; my little secret for now, until familiar with recruits, confident of intentions). Must include invitation to visit, partake in mutual deliberation over whether acceptance into community advantageous both ways.

Have also concluded, after initial hesitation, message must contain explanation of *H. sapiens/post hominem* situation, etc. Facts, evidence clearly documented; Teacher's conclusion unaffected by scoffers—but doubt will care much for neighbors lacking minds sufficiently open to appreciate data, understand implications, and (most of all) accept *necessity* of next step:

Central industry in *my* community to be AA-type upbringing, education of children (to degree possible in ruined world). All else secondary, supportive. No compulsion, pressure; volunteers only. But dissenters need not apply. Big world; can live elsewhere.

Granted, noble resolve most conveniently parallels own selfish desires (*so* much to learn!); but if Dark Ages follow

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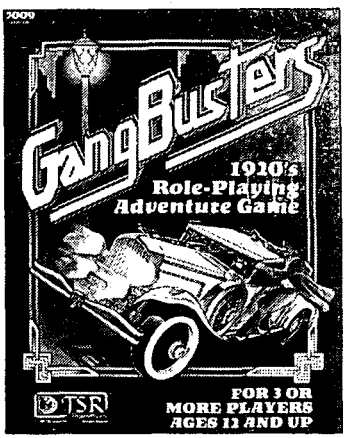

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collapse of *H. sapiens'* civilization, won't be *my* fault.

There! Not so tough: mere three days' full-time, unremitting labor—writing, rewriting, trimming, condensing, paring, slashing, distilling, rooting out rewriting, etc., etc—and leaflet complete.

Masterpiece of brevity: Single page (legal size, double-sided; uniform 1/10th-inch margins top, bottom, left, right; 15-pitch type) says everything necessary in only 5,768 well-chosen words —plus metaphoric extra thousand implied by tiny map sketched at end.

Initial small stock produced on nifty both-sides-at-once Xerox. (Wonderful machine; some benefits of old civilization *must* be saved for Posterity —10,000 copies, *three hours!*)

Shall affix to doors of food, hardware, sporting goods, clothing stores, etc., as ride along. Pass hundreds every day; been taking local roads rather than interstates. (Esthetic choice; admittedly not logical: interstates doubtless better condition, easier driving; but somehow lonelier [*said* wasn't logical], more depressing.)

Not terribly original plan, but *I* forage constantly, almost daily; reasonable inference holds other survivors do likewise. And certainly have generally similar needs, "shop" same places.

Final analysis—becomes question of numbers: post enough leaflets, bound to catch eye. Somebody's eye. Someplace. Sometime. Probably.

Tomorrow leave for Boston. Harvard-M.I.T. area, home for five AAs: Herman Smith, Mario Ling, Gayle Kinnart, Theron Parker, Rex Hollister.

Parker, Long, Smith deeply involved (according to File) in project combining M.I.T.'s space research center, computer center, nuclear reactor, magnetics lab; Harvard's medical school, biochemical facility, seismographic station. Wouldn't discuss objective, but spin-off breakthroughs, inventions, products so numerous, administration declined to push it.

Hollister working at Harvard only, but at medical research, anthropology, biophysics, geology, political theory.

Kinnart's Ph.D.s in nuclear physics, oceanography, computer science, meteorology, astronautics. Worked when, where, with whom, on what she chose. Taught, researched, invented at will. Delighted in shaking up Establishment's institutions, the crustier the better; C.L.E.P.'ed Juris Doctor in spare time, over organized opposition of Bar (disapproved failure to utilize proper law school channels). Sued *pro se*, won, obtained J.D. by Supreme Court decree. Also holds Seventh Degree Black Belt. (If consciously, actively seeking role model, girl could do lots worse—hope she likes me.)

Enough woolgathering. To bed now. Far to go tomorrow; much to do.

But calmly, coolly; optimistically but with caution, discipline. No more paralytic disappointment, hysteria, tears—*no matter what*. If trail proves cold, will play hand as dealt: study facts as materialize; proceed logically, efficiently as indicated.

But can *hope*. . . .

Silly me. To think, really expected to make Boston in single day (seemed

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reasonable goal while studying map: Only 275 miles, straight-line distance).

But not crow, not flying. Driving. Slowly, cautiously. Through heavily wooded, very hilly (almost mountainous) terrain; numerous small towns, villages; over narrow, winding, bumpity road obviously surveyed, installed by larcenous paving contractor whose sole ambition (well and truly realized) was smothering in concrete most expensive distance between any two points.

Together with previously observed uniform deterioration of highway system, conditions generally less than ideal for rapid transit: downed trees, abandoned vehicles, landslides, etc., do little to speed progress.

Then final unexpected barrier: Hudson River. Not anticipated as problem; maps show bridges all up-, downstream.

True, are many bridges; however, those encountered thus far quite impassable: Some blocked by horrendous traffic jams; some visibly unsafe, spans sagging, etc.; some actually collapsed, lying in, under water. Several boast combinations of all of above. (Prefer not to think what must have been like when refugee-laden bridges, loaded beyond designers' worst nightmares, came down.)

Camping tonight on romantic west bank, at lush forest's edge, under clear, star-studded, moonlit sky. Doubtless be more favorably impressed if conducting appraisal from other side.

Tomorrow will head south along river. Bridge frequency increases as approach New York City. Bound to get across sooner, later.

Delete previous pearl of wisdom. Written by idiot, without consideration of facts, human nature. Indeed, bridges more frequent to south. Also bigger, wider, more capacious. However, increased population more than made up difference.

Drove south all the way to Newark, Verrazano Narrows Bridge to Brooklyn. All blocked, damaged, or both.

Jams on surviving spans exceed belief. Example (not worst): Faced with immovable crush of vehicles parked on George Washington Bridge, obsessed beyond reason, control, someone elected to leave Manhattan—in large bulldozer, *over top*. And so tightly packed together were cars in path that most occupants unable to open doors, squeeze through windows, etc., flee in time. Predictably dreadful results. (But *someone* coped: Operator, crawler both dead; stopped halfway across, perched like giant carnivore on mashed vehicles beneath.)

Camping again tonight on romantic west bank of Hudson River, same place as night before last—same lush forest, under same clear, star-studded, moonlit sky, etc.

(Bah. . . !)

Tomorrow will head *north* along river. Population density decreases considerably that direction. Bound to get across sooner, later. Or drive *around* damned thing.

Murphy would have snickered, said: ". . . *told* you so." And been right: Very first bridge north of where quit exploring, three days before, stood wide open, unobstructed, safe.

Crossed without incident; continued through New York State, into Vermont, southeast across Appalachian Mountain

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spine into Massachusetts—into more bridge trouble: Connecticut River.

Pretty stream. But wide, impassable due to bridge damage. Lots of bridges, lots of damage. Appears to have been heavy flooding earlier: Barges flung about like toys; presence of bridge supports in paths presented little hindrance.

None daunted but wiser now, headed north immediately, upstream. Mere 150 miles sufficed to bring us to intact span.

Across and flushed with confidence, headed again southeast—toward Boston, with no potential geographical obstacles visible ahead on map.

Be there by noon tomorrow, barring untowardnesses.

(And *not* getting excited. Waiting to see what lies ahead. Calmly, coolly, objectively.)

Nothing lies ahead! Or sits, stands, hops, skips, jumps. And getting mighty fed up with whole business.

Once is nothing more than random incident, dice cast, crumbled cookie, flopped mop. Twice probably coincidence, without statistical significance; no doubt concerning to pessimist, but not alarming to rational intellect. Three times could still be coincidence, but scary coincidence; probability laws bent way out of shape.

Four times is trend. No doubt about it; worry is appropriate response.

And *six* times—conclusive. Utterly so.

Nobody home. Again. All signs point to orderly move-out. *Again*. No clues suggesting possible destination, whereabouts. *Again!*

Performed most thorough going-through of homes, offices, labs of all five M.I.T.-Harvard-area AAs. Turned up nothing. Simply vanished. Carefully, efficiently, without loose ends.

AGAIN!

Kinnart's house first stop; then office. Scene at house duplicated Peter Bell's. Office equally barren: everything personal, if even faintly portable, gone. Results at Smith's, Ling's, Parker's, Hollister's similar, equally dismaying. No affirmative data; all evidence negative, inferential, based on what not found.

Returned to Kinnart's house for night. Lovely place: Even stripped of personal touches, still homey; retains comfortably feminine ambience.

Great relief after weeks of living in van, sleeping on bunk, cooking with charcoal, sterno. Electric power out, but gas, water still work. Easy enough to run extension cord in for evening's lighting.

Decision to spend night under civilized roof met twin's approval. Loves travel, but *bon vivant* at heart; wallows in luxury at every opportunity (believes anything worth doing worth overdoing). And apparently concluded time ripe for good wallow: Hurled self into project with glee (mere fraction of which, publicly displayed in times past, sure to result in involuntary hospitalization). Participation included: assisting carrying tee stand in from van (me carrying; manic sibling gripping crossbar with toes, wings flapping at max); unpacking food (container-opening one of brother's pettest passions—problem arises confining pastime to appropriate time, place, object); setting table (loves this part: waddles joyously about tabletop, seizing plates, utensils—anything not nailed

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down—laboriously carries/drags to edge; surreptitiously peeks around to see if observed yet; then heaves over edge, watching fall, bobbing head, chortling under breath as impact occurs—then back for more).

In especially rare mood today; having wonderful time: Talking, warbling like trained chainsaw, assisting until seemed must be three of him. Finally became necessary—to retain own sanity—to banish to stand, order him, "Stay!"

Feelings unruffled by rebuff, of course. Within moments had discovered refrigerator handle within reach. While doing sideways chin-ups, indicated continuing willingness—nay, eagerness—to help clear table. Before meal was over.

Had turned on gas first thing on arrival, lit water heater. Have put clean sheets on firmest bed in house. Looking forward to indescribable pleasure of hot shower, followed by best night's sleep in weeks.

Looking forward *intensely*—helps keep mind off AAs' disappearance. Impossible six people could vanish so utterly, without *any* clue.

Well, perhaps morning will bring inspiration: Maybe subconscious noticed something so-called "conscious" missed while worrying.

Good night.

Eureka! (Sort of.)

Upon waking this morning, realized search not thorough as should have been. Oh, thorough enough regarding not missing single drawer, looking under beds, examining every inch—but was looking *for* things; paying no attention to what might be missing. Stated in yesterday's entry: ". . . all evidence negative, inferential, based on what not found." But made no effort to determine *what* not found; haven't inferred worth darn.

So following breakfast (found old-fashioned campfire waffle iron in basement; works equally well on kitchen gas range—results *wonderful* with maple syrup after so long) adjourned back to Kinnart's office; conducted repeat search, this time with eyes, perception, *mind* open. And learned:

Remaining lab contents limited to stock equipment, scientific goodies available anywhere. Nothing visible appropriate to work of most brilliant researcher in five (un?)related fields. Vacant table space suggests missing equipment, but not much. And no clues as to what.

However, one artifact obvious by absence—her First Microscope. (Every student scientist and/or doctor receives as gift or purchases in school a First Microscope. Sometimes powerful, sophisticated instrument; sometimes Woolworth's Student Special—but always treasured for life; always prominent in office, whether used or not.) Absence significant.

But not as glaring as lack of any scrap of work notes, memoranda, programs, floppy disks, photographs, printouts, results—in short: irreplaceable stuff, without which any research reverts back to square one.

Went back then; reinspected homes, offices of other four Boston-area AAs; confirmed similar conditions. Physical gear remaining wondrously varied but limited to catalog stock; nothing custom-made, no records. And *no* First Microscopes!

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So much for available facts; now for inferences: Left, probably as group; went somewhere already physically equipped to continue studies, taking more specialized, irreplaceable tools, notes, records, etc.

(Granted, premise requires quantum leap past logic; but given reasonable parallel between their thinking and mine—and assuming also work in progress [and opportunity]—only tenable conclusion.)

Besides, was *necessary:* Had, while ruminating, forgotten Armageddon side effects. No possibility hominems, with olfactory sensitivities far transcending *H. sapiens'*, could have remained in population-dense Boston area during months immediately following species' end. Or any large, heavily peopled area. Own experience in tiny Wisconsin hometown proof enough: Had not spent first three months sealed in shelter, breathing own recycled air, would have been driven away.

So—again—what now? Conclusions interesting, probably valid—almost certainly valid. Also, in practical terms, next to useless. Even were conclusions confirmed—all Tarzan File AA addresses in fact obsolete—so what? Who cares? Equally pointless is speculation over why gone. Ringing question is *where!*

Without *some* hint—positive data, not accumulation of negatives—search deteriorates to pure exploration. Futile on face of it; continent simply too big for random poking about. Too much area; too few targets—and even methodical search won't improve odds. Not really. AAs might well move into section just covered, remain undiscovered forever.

Besides, what (beyond wishful myopia) limits scope of search to North America? Whole planet now available (excepting only several extremely radioactive areas in Asia, where [according to Daddy's secret papers] U.S.'s displeasure over attack most intensely expressed). Would be surprising should AAs fail to capitalize on all available resources, natural or man-made, wherever extant, to found, secure, develop community from which to gather, store, preserve, ultimately extend knowledge base accumulated during *H. sapiens'* sway on Earth.

Hmmm . . . Uninformed observer might suspect pattern developing here: Seems every time central question ("What now?") crops up, somehow vanishes again beneath welter of irrelevant detail, philosophy, speculation. (Goodness . . . Candy Smith-Foster subconsciously refusing to face facts? Perhaps because answers unpalatable?)

Nonsense! Nothing subconscious about it. Plain as day: scared to death. And with best of reasons: Answers *stink!*

Consider remaining options: One, can assume—not unreasonably after six consecutive strikeouts—Tarzan File truly dead end; set off blindly into wilderness, playing entirely by ear; distributing leaflet widely, collecting ABs catch-as-can, if at all.

Or, two, ignore six-ply coincidence; play out hand as dealt by Tarzan File, follow through to conclusion; not so much expecting dramatic results as sticking to scientific method, ensuring resultant fine-tooth examination of

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homes, offices overlooks not least clue suggesting whereabouts.

Then set off blindly into wilderness.

Or silly-season stuff, among which least harebrained notions include: acquiring necessary knowledge (not impossible, considering formidable reading speed, comprehension/retention level); constructing, activating powerful omniband radio station; broadcasting endless worldwide appeal for company.

Or how about skywriting? Attention-getting, certainly; and effective each time over huge chunks of geography. Given *H. post hominem* mind, reflexes (far quicker, better integrated than predecessors'), how difficult can be to learn aircraft operation basics? Memorize book, absorb theory; then apply practical. (Shucks, Wrights only human, managed *without* theory.)

Probably neither truly silly-season ideas. Far-fetched, yes. But not totally beyond pale, given sufficient impetus (i.e., desperation—cornered rat apt to try anything).

No, not really silly—*silly* is debating whether might be possible very quickly to breed special strain of mosquito (limited to drinking hominem blood); securing very small notes to very tiny collars, sending out to spread word.

Now, *that*'s silly. . . .

And demonstrates lengths will go to to avoid facing "What now" question. Not that have any real choice: big world; only information even potentially helpful is Tarzan File, whether current or not. Must be verified, unto bitter end if necessary. As well might be.

So. Six down, 93 to go. Next stop: Baltimore, Johns Hopkins University; Barbara, James, Frederick Harper. No, not related—*family*: Idyllic *ménage à trois* of several years' standing. Harpers, according to file, enjoyed benefits, protections of marriage laws, without violating them but without common-law togetherness risks, by simply *co*habiting; defining responsibilities toward one another, to heirs, regarding assets, etc., by forming corporation, incorporating into by-laws useful provisions from marital, probate law. Reported very happy. Perhaps all three being doctors, dovetailed specialties, helps.

Discovery piqued curiosity. Checked further through file. And learned plural living arrangements not uncommon amongst AAs: fully one-third involved in family units of more than two. Largest such encompasses five.

Intriguing. But not sure my cup of tea. Earliest memories pervaded with gently intense love emanating from, between, all around Daddy, Momma Foster. Couldn't have spent formative years basking in glow always surrounding, enveloping them and anyone near them, without being imprinted to some extent with bias toward general wonderfulness of twosome life—joy of being single most important thing in life of Someone Wonderful.

Certainly hope Harpers home. Apart from obvious, interested in observing daily workings of family life; see whether they glow together. (If so, at what intensity in which combinations.)

Off tomorrow to Baltimore—or perhaps "toward" more realistic preposition: Though only 427 miles, according to map, *know* about map distances now (been through that before, haven't we). So don't expect to make it in single day. Or even two, three.

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c. T.D. (and a P. in a P.T.)
d. 9 = I. in a B.G.
e. 9 = P. in the S.S.
f. 30 = D.H.S.A.J. and N.
g. 50 = C. in a H.D.
h. 212 = D. at which W.B.
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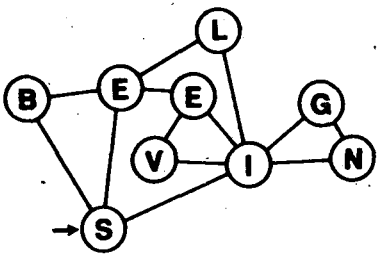

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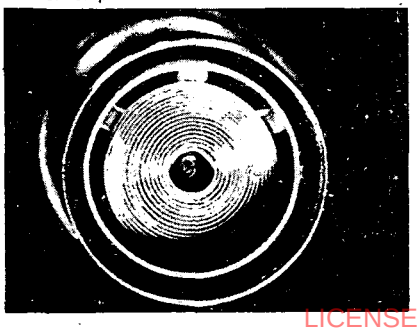

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JDV14

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For one thing, must retrace path around much of Connecticut, Hudson Rivers—doubles distance right there. Additionally, frequent stops to post leaflets in promising locations takes time. Finally, map shows two additional major rivers between here, there (Delaware, Susquehanna); both so convenient to large populations, almost certain downstream bridges useless.

Can't take less than week. Maybe two.

If possible at all—for very different reason: While hasn't been hint of residual radiation heretofore, Baltimore very close to Washington. Capital one of few targets across land scheduled for broken windows: according to Daddy's secret papers, favored with many direct hits. Quite conceivable D.C. area still hot. Equally probable, Baltimore unsafe as well.

Been testing ambient background radiation periodically with Geiger counter from shelter (recent design; lightweight, quite sophisticated [nine-tenths of capabilities completely over head]); will step up checking frequency as approach Baltimore area.

Bedtime again—after another deliciously hot shower. Then to that firm, cool bed.

Tomorrow beckons. . . .

Yes, Posterity, derelict again—sorry. Trying to do better, really. Sometimes difficult to muster energy. But trust me: missed nothing through failure to enter daily progress from Boston on regular basis. Omissions, if any, not substantive in nature—*events* not substantive; absence from history books not world-shaking.

Because mostly dull. Indescribably so. Hundreds of miles. Some on roads, some not. Thoroughfare varied from expressways to pasturelands; passability from utterly not to unobstructed. Myriad get-out-and-copes. Engaged four-wheel-drive lots. Cleared path with winch frequently. Doubled back often.

First break in routine came while working southward through rural portion of Pennsylvania, apparently egg-farming region. Accidentally rediscovered old source of fresh meat: hit chicken. Happily, not going very fast; killed cleanly with bumper instead of mashing flat with tire. Stopped, cleaned immediately; roasted over charcoal for early dinner.

Delicious—thought so myself—but Terry transported beyond ecstasy: waded in with gusto; split, pulverized bones; cleaned out every scrap of marrow, gristle. Long time since last chicken dinner; poor baby probably in throes of withdrawal.

Experience profitable long-term as well as short. That night switch clicked in brain, disturbing sleep. Old switch. Primitive circuit.

Found self suddenly awake, staring into darkness. Pictured clearly in mind's eye was T-shirt seen on tourist several years back: cartoon of hungry vulture glaring down from tree branch, muttering, "Patience, *hell*—I'm going to go *kill* something!"

H. sapiens not scavenger. Was, in fact, puny physique notwithstanding, deadliest predator on planet. Any reason for successor to be less forthright about satisfying appetite? Moral issue, per-

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haps? Should *H. post hominem* be vegetarian, as philosophical principles?

No. . . ! Nothing philosophical about vitamin deficiency, creeping malnutrition. Granted, probably entirely possible for hard-working, full-time agrarian to raise sufficiently diverse crop to constitute balanced meatless diet. But for explorer, nomad, simply not practical.

So next day, again feeling carnivorous (anticipating brother's vote if asked), stopped van, caught chicken in footrace. Issue considerably in doubt at first. Prey ran to, fro, dodged about squawking. Wondered for time if might have to resort to gun.

But finally zigged when smart money all on zag; fell victim to feral pounce to gladden heart of primalest hungry raptor ever admitted to guild—which, in fact, by then apt self-description (though neither growled during chase nor stood with foot on kill afterward, beating chest, screaming mangani victory cry).

Dinner that night especially tasty. Perhaps calories expended in pursuit honed appetite; perhaps enjoyment on more atavistic level. Hard to say—and don't much care: if reverting, will enjoy it.

Began edging westward to flank Delaware River while still far enough north that detour of little consequence. Finding passable bridge never became issue.

But same not true of Susquehanna; another matter entirely: long, extending far northwest, very wide. Bridges encountered during initial exploration all collapsed. Began to think might have to circumnavigate after all. Until came to railroad trestle.

Stopped van abruptly. Stared. Deliberated at length, with distaste. Reconnoitered on foot, all the way across. Took careful measurements.

Yes, was possible—probably not even actually dangerous. But uncomfortable notion: Span between tire tread centers and track separation identical; giant mud/snow flotation tires fully 15 inches across tread face, providing perhaps four inches' grace either way before risk mounted. And even if did allow vehicle to slip off rails, wooden ties sufficiently closely spaced to permit crossing completion by bump-bump-bump method, assuming care, deliberate progress.

(Rather *not* slip off rails, though, thank you. True, walked entire span; inspected structure for apparent faults. But layperson; key word is "apparent": not versed, personally, in abstruse skills required to determine at single glance which tie sound, which rotten. And cantilever loading provides severest test of strongest member; little doubt that bump-bump-bumping whole way across surefire system for substandard tie detection. Quick, positive detection.)

However, longer debated matter, less attractive became alternative. Judging by map, dearth of bridges upstream, mountainous contours of land, can't-get-there-from-here character of roads, less appealing became prospect of driving around Susquehanna. Looking at thousand miles at minimum; probably more, considering present-day road conditions. Did not care to spend another two weeks getting past dumb river.

Therefore backtracked to last small town. Located hardware store; scrounged to good effect, assembling components necessary for Rube Goldberg device in-

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trinsic to rash solution: mirror, mounted out at end of tripodish boom secured to front end of roof rack, both ends of bumper; with control rod permitting accurate positioning from driver's seat —enabling direct observation of front tires' actual ground-to-tread contact point, removing seat-of-pants element from precision driving required to remain on tracks.

With mirror boom in place, control rod tested, working properly, next step was getting van perched on tracks. Accomplished well back from trestle, on solid right-of-way.

Front wheels easy; went where pointed. Mostly. Were, of course, encountering rails at fairly acute angle. With four-wheel-drive engaged, transmission in first gear, transfer box in low-low, released brake, eased out clutch, crept forward inch by inch. Right front wheel climbed first rail effortlessly, dropping to roadbed between tracks. Double contact next; double weight also—and doubled resistance, as smooth steel-rubber coefficient attempted to hoist weight of van's entire front end. Progress first limited to sideways, tires glancing off rails' shoulders, sliding along tracks without mounting. But finally corners of big mud/snow treads caught, drew front end upward. Moments later, following careful steering adjustments, front tires centered on rails.

Rears another matter, however: Right rear stubbornly dragged against left track for 30 feet before bumping up, then over onto roadbed between rails. Then for good hundred feet both rears clawed ineffectually, unable to gain purchase.

Finally, with bare hundred yards remaining before commencing trestle ascent, gave up. Set brake, exited. Employed shovel to pile up small gravel ramp against rail ahead of each rear tire. Primitive solution (employing engineering principles well regarded in Pharaoh's day) but serviceable: Five feet beyond, all four wheels poised neatly on rails.

Astonishing, after all that effort, how quickly enthusiasm for project (product of own cleverness) waned.

Ten feet out on span, to be precise. Just far enough for hitherto unnoticed breeze, unimpeded now by aught but trestle's cobweb structure, to seize ample sail area presented by van's slab sides and nudge. Gently but perceptibly.

(In retrospect, doubt actual chassis movement [limited, of course, to slight suspension yield, tire sidewall squirm] exceeded quarter inch in any direction. Then, however, felt like major tectonic adjustment.)

Was suddenly conscious how very different trestle had looked from on foot: wider, solider, *much* more secure.

And wooden ties projecting from under tracks on either side appeared shorter now when viewed through windshield from driver's seat, with river as background beyond, below—far below. Tie ends not visible, for instance, through side windows—*nothing* visible through side windows. Except distant ground, river.

Noticed van had stopped. Wondered briefly if due to wind also, until discovered (looking past white-knuckled hands gripping steering wheel) both feet apparently trying to push brake pedal

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through floorboard. Had forgotten clutch; engine dead.

(Probably just as well. With engine dead, could not yield to rash impulses: Could not attempt to back up. Mirror not placed to permit observation of exact rear tire/rail relationship, nor could envision any practical means of doing so. Further, geometry inherent in reverse steering precluded making attempt to regain solid ground astern: Small angular changes at rear are product of large lateral displacements at front: Would have led to immediate bump-bump-bumping. Or worse.)

Became aware was perspiring all over. Felt spontaneous aching sensation in soles of feet, palms of hands. Eyes began to burn, tear. Noticed also mounting sense of suffocation.

Memory chose that moment to call up, play back life-long accumulation of admonishments concerning Bridges, Premature Burning Of; Corners, Painting Oneself Into; Leaping Before Looking; etc. Cheeks grew hot; glad Teacher couldn't see star pupil then, frozen at wheel amidst predicament created solely by own failure to consider all aspects of problem before charging in.

But wait—what if Teacher *were* watching. . . ? From Above. Wouldn't do to let him see funk continue. Momentary startlement probably barely excusable, considering circumstances, provided not carried beyond limits of good taste. If watching, Teacher would expect to see constructive signs of recovery soon. Or would look sorrowful; make entry in notebook. (Said recovery no doubt expected to include movement of portions of completely paralyzed body—that would be hard part.)

With effort almost physical in character, managed to wrench gaze from river below. Turned perceptions inward, initiating code sequence leading to transcendental state. And reaped prompt dividends: Upon closing eyes, cause of optic discomfort immediately evident—probably hadn't blinked for whole minutes! Likewise, shortness of breath alleviated by resumption of respiration. . . .

And as meditative discipline took hold, thought processes again began to acquire semblance of coherence; acted to clamp down, brake churning emotions; restore control. Heartbeat slowed, perspiration subsided.

Opened eyes; focused on point at which rail disappeared under tire. Noted was perfectly centered under tread. Directed attention to left hand. Tried three times before fingers unclenched from wheel; shifted grip to mirror control rod. Readjusted mirror to inspect other tire, rail. Also centered.

Okay. Everything. Under. Control.

Returned mirror to left tire, rail; without angles to allow for, offered more direct observation, clearer perspective.

Returned left hand to wheel. Eased right hand's grip to point where feeling returned to fingers; moved to ignition switch. Took longer to get left foot from brake pedal, depress clutch. Turning key required act of raw will.

After being clutch-killed, engine started raggedly, settling into lumpy, galloping idle as gas-soaked plugs shorted, fired, shorted again. Torque reaction, transmitted through engine mounts to chassis, produced motion almost as scary as wind.

Ignored it. Moved right foot from

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brake pedal; placed gently on accelerator. Eased clutch out (had never taken out of gear); applied hint of gas. Forward motion resumed.

Applied fraction more power. Small fraction. Proceeded deliberately. About two-thirds mile across trestle, but in no hurry. Plenty of time.

Quickly learned driving not that difficult: merely question of keeping eyes fixed on rail disappearing beneath tire tread; steering precisely to keep centered; ignoring van's frequent wind-induced shrugs. (And ignoring scenery and own position relative thereto.)

No, not difficult at all. But rather tense work; and as initial session dragged on, began to feel effects of prolonged concentration; decided might be wise to stop, take breather. Did so; looked around—discovered had come barely hundred yards!

No, wasn't difficult. But took best part of three hours to complete crossing.

And when finally cleared trestle, solid ground under rails beneath all four wheels (waited until could confirm in rear-view mirrors to ensure wasn't being fooled by optical-mystic illusion; do something silly while rear end still overhung void), wasted no time turning sharply off tracks, bumping over rails, driving down embankment to level ground.

Stopped, got out; walked back to cliff edge, breathing hard. Suddenly rubbery legs seemed to suggest another time-out. Sat abruptly. And as stared out over valley, down at river, up at bridge, found was reviewing incident in detail: Had saved minimum of week's travel; and barring ever-present potential for untoward developments arising out of mechanical failure (and despite recurring apnea episodes during crossing), probably not *inherently* dangerous. Reflected at length, totaling pluses, minuses.

Finally concluded: *stupidest damn-fool stunt have ever pulled. . . !* What was all-fired rush? So *might* have had to spend another week circling river. Or month, for that matter. So *what!* Not as if on *schedule!*

Mechanical-failure risk *real;* but only then, sitting at brink, contemplating vistas conquered, did practical implications sink in: What would have done had tire gone flat mid-span? Or engine quit? Or *steering* came adrift. . . !

Sum of potential failures through which could have been stranded or pitched into space at least equals, probably exceeds, total number of parts of which van constructed. Madness to hazard position in which ten-cent part's failure could cause other than fleeting botheration.

Now, loss of van not disaster *per se;* replacements endlessly available, one form or another. But inconvenient; much semi-irreplaceable equipment aboard. (To which considerations might be added inconvenience attendant to dropping self, Terry into river, some bunchteen dozen feet below.)

However, when scrutinized under gimlet microscope of hindsight, incident not entirely devoid of redeeming aspects (apart from obvious: yes, am across *that* bridge). No question now: been blundering along, gripped by curious form of mental myopia. Tight grip, too: Even when glimmer of sense raised head (in form of blithering panic ten feet from safety), never entered head

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to abort—set brake, seize Terry, abandon ship through rear doors.

Few bridges thus far encountered actually physically impassable—to pedestrian. But for blinder-mindedness regarding van, could have *walked* across, carrying gear; then picked new vehicle on far side. Certainly no dearth of replacements.

Sure, would take several trips to move whole inventory. Probably hard work. But quicker than driving around each river found sprawled across path. (And surely easier on nerves than emulating Wallendas.)

But, incredibly, was first time concept crossed mind, even as most fleeting of notions. (Curious behavior for certified genius—perhaps should just resign gracefully; avoid humiliation intrinsic to being found out, summarily drummed from corps.)

Okay! *Was* stupid—lesson learned. But water over dam; no benefit accrues from brooding over mistakes (besides, sackcloth itchy; ashes hard to shampoo from hair). On notice now—van expendable; shall keep fact in mind.

(But perhaps, in exercise of reasonable foresight, new policy implementation unnecessary. Ever. Because not truly fond of idea—not through fuzzy sentimentality, irrational attachment to inert mechanism, of course; practical considerations only: Supremely capable on/off-road vehicle; quirks, limitations of which now second nature. Also capacious: lots of gear aboard, stowed neatly; everything in its place, readily at hand. Further, after seat relocation, pedal lift installation, shift lever extension, fits me—not insignificant factor from four-foot-ten-inch perspective. Besides, finally have galley in shape: Cabinets, drawers organized; stove, oven properly broken in. Hate to go through that again.)

So van expendable, true. Fact now in mind. But "expendable" not synonymous with "consumable": That fact in mind, too. Next question, please.

Which (from *serious* historian, student) must be: Did you find anyone, anything, in Baltimore?

Answer: Of *course* not. Yet—just got here. (Apart from happy discovery that, proximity to Washington notwithstanding, ambient radiation still reads within normal limits.)

Harpers not home; no surprise there. House displays usual signs (which have come to know, hate) of methodical move-out seen elsewhere. No clues immediately apparent; fine-tooth search must await morrow—been long day.

But first, another wallow in civilized decadence. Power out along much of east coast, but Harpers' house totally solar powered, plus has own deep well—utterly independent of local utilities. Flip switch, electricity restored. Water standing in system already hot from automatic convective functioning of calorie-collector on roof; with electric working again, pump stands ready to replenish water as used. In brief: *hot shower time again!*

Which is practically first thing did upon investigating house. Supper preparation, consumption next; only then turned to present journal update. (Sorry, Posterity; itchy, smelly skin and empty belly come first.)

And delays aside, now appears have done duty: noteworthy activities mem-

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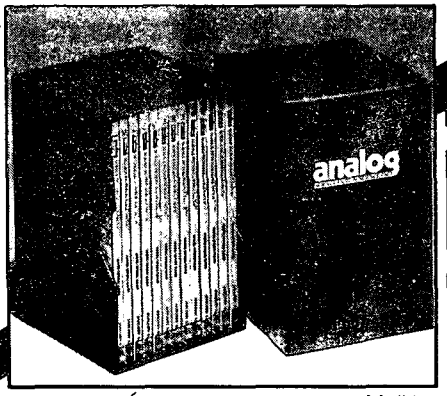

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orialized. Time for evening's revels to peak:

Three beds to choose from. Not difficult decision, though: king-size unsuitable (truly; have walked on marble floors with more resilience); queen-size fitted with ten-inch foam mattress (into which unwary sleeper might sink beyond hope of rescue). Twin bed, however, is Just Right.

Good night, Posterity.

Goodness. . . ! Hard to know where to begin. So *much* to relate, but must keep tight rein on impulses lest record become even less coherent than usual. Strictly, therefore, by chronology:

Arose well rested. Indulged in another long, hot shower. Prepared breakfast with usual hilarious difficulty; fending off, with effort, assistance intensively volunteered by jovially ravenous sibling (surely most trying aspect of relationship; seems the earlier the hour, more unbearably cheerful becomes).

Performed usual half-hour *kata* to settle breakfast, loosen up musculature.

Thereafter went through house. Thoroughly. Negative result pattern confirmed suspicions previously formed: deliberate, preplanned exodus; whether prior to *H. sapiens'* demise or immediately thereafter, unknown, immaterial. Lingering question still *where*.

Finished house examination; time to extend sweep to offices, general work environs. Packed, adjourned to van. Dug address list from Tarzan File, placed on dash next to wheel. Cleaned, refilled Terry's water, seed dishes—of *course* bringing twin: Wouldn't *dream* of leaving birdbrained innocent alone, unprotected. Besides, what if failed to return? *Ever*. Food, water soon run out. Consequences inevitable; details (how end arrives, how long takes) simply don't bear thinking about! (Yes, retarded brother's constant companionship high in nuisance value [often downright maddening], but *necessary* to peace of mind.)

Located city map at nearby drugstore, oriented self, located destination; set forth in general direction of Hopkins campus, specifically private doctors' office park located adjacent to teaching hospital.

Never got there.

Everything happened at once, in slow motion: One moment was driving east down medium-wide downtown arterial (four lanes, no parking; high-rise buildings jutting from sidewalk edges to form concrete canyon), slowing to turn south at next corner. Next moment, just as moved wheel to begin turn, caught glimpse (same instant heard engine's bellow, tires' shrieking) of gold-trimmed, shiny black blur already entering intersection from south, turning west: full-race Trans Am (wide wheels, tires; unmuffled chrome headers; heaven knows what else) flailing into corner almost sideways, on radius which, requiring entire width of both streets, terminated somewhere between own vehicle's headlights.

No time for cleverness—instinctively stamped on brakes, threw hand up to brace Terry, stiffened other arm on steering wheel to brace me, gritted teeth, awaited outcome.

Trans Am driver did react, somehow: Sensed, rather than saw, front wheels twitch outward; heard engine's thunder

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falter, almost gasp, then redouble. Hurtling vehicle's sideways approach around corner abruptly changed radius, momentarily flattening curve, missing van's left front corner by merest fraction of flinch.

Progress thereafter less clear: Observation limited to what could make out in mirrors.

Trans Am apparently completed slide around corner (and own frail self) by slapping right rear wheel into curb, with front wheels still pointed sharply to right. Sliced immediately across sidewalk into storefront.

Vehicle, building, both erupted in shower of fragments, dust, sudden plume of flame. Remnant of car ricocheted from impact cloud, spinning like dervish, shedding parts en route, to recross street. Smote that building tail first with horrendous thump, triggering yet another debris explosion, considerably more flame; from which emerged still spinning, appreciably smaller, still shedding parts, now gushing fire in earnest; recrossing street to crash again. And still again. And—oh, never mind.

Would be nice to report own reaction at this point cool, efficient, intelligent. Can't. Wasn't. Intellect momentarily shut down completely. Forgot existence of large, fully charged CO_2 extinguisher; forgot about Gel-Coat (flame-retardant, wet-chemical-soaked blanket with whose protection could have *bathed* in burning gasoline for five minutes without discomfort); forgot about Hurst gasoline-engine-hydraulic rescue equipment (capable of ripping open any door, shearing off roof posts, unpeeling vehicle crumpled like ball of foil to extract occupants); crowbar, sledge—all languishing in lockers in rear of van. Even forgot to set brake, shift transmission to neutral before taking action. (Didn't matter; had killed engine again in heat of moment.)

Only knew finally had found *somebody*—possibly very last other soul on Earth—and might be dying before own disbelieving eyes.

Sprang from driver's seat while accident still unwinding (seemed to take *forever*). Landed in dead run. Forced to hurdle several gasoline trails left burning as careening wreckage crossed, recrossed street between impacts.

Overtook accident at Trans Am's ultimate resting place, half buried in display window some hundred yards behind van. Arrived as building material cascade tapered off; rubble piling high on roof, hood, trunk, littering nearby pavement.

And since kamikaze slide's final yards were backward, vehicle now resting on own gasoline track; flame pond spreading slowly about wreckage, storefront, as contents gurgled from ruptured fuel tank (rescue growing more complicated even as stood there, shielding face from heat [painful even at ten yards], squinting through inferno for glimpse of occupant).

But not last-desperate-second, screaming-crisis emergency; merely grim. No flames yet visible in interior; reasonable to assume passenger compartment intact (underneath, at least; topside a mess: Glass gone, along with bumpers, fenders; front windshield posts both torn loose; roof at angle never contemplated by styling engineers).

Cooked occupant inevitable but not imminent; had time to secure from van

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equipment appropriate for crossing gasoline lake safely, forcing probably jammed door, extracting victim, retreating in good order.

(Never mind exploding gas tanks —exist only in fevered imaginations of sensation-oriented, irresponsible Hollywood screenwriters: Fire Marshal Hathaway [Daddy's friend, neighbor; lived just down street] said so. Claimed endless fueling of myth fostered needless widespread explosion-fear. Marshal Hathaway considered filmmakers' behavior quasi-criminal —certainly reckless negligence: Public saw so many crashes-followed-by-explosions on TV, in films, believed it; and more people's injuries compounded when unprofessionally dragged from wrecked cars —burning or not—by Good Samaritans fearing explosions following accidents than recordable.

Liquid gasoline doesn't explode; only gasoline vapor, *correctly mixed with oxygen*, explodes—and only if ignition delayed until precise moment ideal mixture achieved. Burning cars *don't* explode.)

None of which rambling bears on fact driver in fair way to roast if not gotten out promptly—gasoline fires *hot!*

Therefore, steeled heart, clamped down emotions, blocked from mind distracting awareness of real stakes at issue; concentrated dispassionately on tactical evaluation, selected tools, commenced organized rescue effort. . . .

Well, not exactly. (Mind *still* shut off.)

Took short run, dived headfirst. Passage through flames too brief for more than hint of real heat; felt only momentary, intolerable oven-like sensation; had barely time to be startled as breath sucked from lungs in reaction. More startling was incredible roar as flames licked at face, hair, clothing: From distance imperceptible; at heart of conflagration sounded like freight train.

Sailed through left front side window, fetching up in disarray on far side against door. Raised head to look around, discovered was gasping for breath: Already pretty warm inside.

Untangled limbs, crawled to driver —sprawled under dash. Examined gently as commensurate with haste, thoroughly as possible under conditions; determined no condition apparent taking precedence over fire: Bleeding from various lacerations ranged from inconsequential to serious, but no fracture grossly evident—though spine distinctly separate question, not determinable under present conditions. Would have to cross fingers.

(Of *course* qualified to render opinion: fair-haired only baby girl of best doctor in whole world! Thoroughly, properly instructed in advanced first aid; more knowledgeable in emergency medicine than paramedic.)

Once assured rescue itself probably wouldn't kill him (him?—HIM. . . !), turned attention to getting us *out:* Really getting hot in there.

Especially floorboard, now that had moment to notice; not ideal storage environment for victim while figuring out next step. Braced self, hauled limp body up one end at a time, dumped on seat.

Cast about interior for inspiration. At first found little cause for optimism. Then attention fixed on rear seat cushion: Ripped from moorings, lay skewed across interior, one end almost protrud-

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ing from rear window. Recognized possible solution.

Tried left door. Not surprised when refused to budge. (But disappointed.) Didn't bother with right door; solidly wedged against wall in which vehicle embedded.

Indulged in moment's worry: Required little imagination to visualize consequences of attempting to push cushion through window, positioning to bridge pooled gasoline; climb through window dragging victim—amidst twenty-foot-high flames. . . !

Options (few at outset) evaporated as gasoline lake outside spread, temperature inside mounted. In fact, as practical matter, single avenue remained. But regarded with disquiet: somewhat risky.

No—*damned* risky. For self (until now personal safety never at issue; could have aborted, exiting same way arrived, exposure limited to possible superficial scorching, crisping around edges) as well as for rescuee: if failed, both dog meat. (Well done.)

Indeed might fail: Strength required far beyond that usually at command. Plus considerable endurance.

Now. Strength available. But endurance most iffy.

Surely everyone remembers stories of ninety-two-pound housewife who, witnessing car fall off bumper jack onto husband, performs 100-yard dash in three seconds flat, lifts car with one hand, extracting hubby with other. Or hiker, confronting grizzly without warning, who subsequently finds self standing thirty feet above ground; on lowest limb of tree too big to have encircled with arms, legs; with no memory of how got there. Etc.

Less widely known: Many such stories true.

Solution arcane but not supernatural. Straightforward biochemistry: Given protein machine (assuming well-toned musculature, ample lung capacity, sound heart, circulatory system in good repair), energy expenditure limited to rate at which fuel metabolized; muscle cells nourished; heat, waste removed. Reserve stored in muscle tissues negligible.

Cells of which muscles composed contract not in unison but take turns; work in relays. System allows each cell a rest period to recharge during even most strenuous exercise; also means only tiny fraction actually participate at any moment.

Now, if stimulus encountered which triggers substantial majority of cells in given muscle simultaneously, awesome feats ensue (along with real potential for popped ligaments, tendons, fractured bones—system *designed* for shiftwork operation).

Own karate training, as with any advanced student, had covered Hysterical Strength, Unleashing & Management Thereof; had gone, in fact, beyond routine analysis, theoretical discussion—into practical: Teacher included hypnosis in curriculum. Planted within psyche post-hypnotic code to loose Beast Within at ultimate need.

Present quandary seemed to fall within definition: Needed more strength than possessed; else would die. Clear enough, even allowing for Teacher's dire warnings.

For nothing magic about transaction. Simple arithmetic: X calories produced, available within Y length of time.

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Rigidly controlled by inverse proportion rule: double consumption, halve duration.

During tests had seen own strength increase tenfold. Briefly. Followed by crushing fatigue: in strict accordance with *tanstaafl* principle.

But saw no alternative.

Lay back on front seat, fanny close to door. Gripped steering wheel with one hand, seat edge with other. Drew back legs, knees on chest. Concentrated inward. Gathered forces; focused *ki* flow into, through legs. Transformed trigger word utterance into *kiai*, intensity of scream hurting throat, and

. . . *KICKED!*

Astounding results: Door burst open, whistled through arc, crashed against hinge limits; welds failed, door flew down sidewalk, bouncing end-over-end.

Instantly air vanished inside vehicle as heat flooded through door opening; searing lungs; dessicating eyes, nasal passages; scalding exposed skin. Smelled burning hair; never doubted was own.

Time of essence now as never before: If couldn't get victim, self, safely beyond flames before metabolic supercharge ran down, likely wouldn't —unconsciousness only seconds away at most.

Organizing actions to avoid waste motion suddenly acquired desperate importance. Snatched rear seat cushion over into front; thrust through door opening (through which flames now licked, beginning to char headliner), positioning to bridge infernal moat. (Or *almost* bridge—just lacked length to span, with pond still spreading.)

Seized driver, propped up into approximately seated position, slumped against seat back. Loosened jacket, pulled up over head, zipped shut. Shoved limp arms down into pants; tightened belt to hold in place.

Shrugged own jacket upward, retracting head like turtle. Placed shoulder just below victim's beltline; tugged, felt weight roll onto back as torso collapsed forward. Slid arm under thighs; lifted, jogging shoulder to center load in fireman's carry. (And marveled at own strength—while dreading impending consequences of reckless squandering: sustained consumption rate surely four, five times norm; probably more.)

Straightened experimentally: bumped roof to gauge relationship between victim's fanny, own shoulders—crouch needed to clear upper door frame.

Fixed seat cushion's location indelibly in mind's eye. Took deep breath, held it; closed eyes, pinched jacket shut over face. And

. . . *LEAPED!*

Time stopped as again felt blast-furnace ambience envelope whole body. Seemed to hang motionless midair; conscious this time of flames probing, digging, seeking access through flimsy coverings. Oppressive heat, pervasive roar blanketed all other sensations.

Feet blindly seeking landing, but impact somehow unexpected, surprise. Cushion yielded underfoot as knees bent, absorbing extra weight; then airborne again, leaping for fire's boundary—and heart stopped as cushion skidded away from legs' thrust, robbing jump of power needed for distance, throwing balance off.

Eyes snapped open, head jerked forward, trying to get clear of jacket; even at risk of optic burns, needed to *see*, re-

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establish orientation—*mustn't* fall while still within holocaust!

Dragged fabric clear of eyes just as cool air washed jacket, over clothing, into lungs; as landed, stumbling briefly, on flat, dry, *cool* pavement.

Shrugged victim to ground; conducted hasty inspection for burning clothing—mine, his. Used own jacket briefly to smother small blaze on victim's left pants leg.

Then attention riveted by rapidly forming pool of blood under leg: bright red—arterial stuff. Probably femoral, judging by amount. Must have been lying such that position created pressure block, preventing loss in car. Moving eliminated obstruction. If femoral, had as little as twenty seconds left—less whatever time had been bleeding in car since first moved.

Heavy denim parted like cobweb before preternatural strength: Tore pants leg open from ankle to crotch; then ripped entirely free from garment. Turned victim over; confirmed suspicion immediately:

Deep gash from medial upper thigh to anterior knee—*spurting*.

Twisted denim strip into rope; looped about thigh above wound. Looked around briefly, wistfully—no sticks within reach. Slid fingers under bandage; made hard fist; partially stood, stepped three fast turns around body, using own hand as stick, tightening tourniquet very nicely, thank you, but cutting off blood to fingertips in process.

Seized collar with left hand, right still lodged in tourniquet; swung victim back up over shoulder into fireman's carry.

Staggered then, beset by flash of vertigo; suddenly aware of warning twinges as muscles all over body threatened to cramp. Conscious also of perspiration abruptly streaming from body in rivers as autonomic system belatedly noticed calorie-consumption rate, tried to do something about mounting internal temperature. And breathing affected now, too: coming in deep, tortured gasps.

But couldn't complain; not unexpected. In fact, remarkable aspect to condition is why symptoms so long deferred—no idea how was still functioning at all. According to data, painfully garnered through previous supervised (and conservative) experiments, activity level sustained during past few minutes flatly impossible. Should have achieved coma long since through massive fatigue products build-up, with vital organs shutting down from systemic shock; death imminent, barring only most profound life support, treatment.

However, seemed less than opportune moment to question blessing. Set off for van at dead run.

Arrived still conscious but deteriorating: heartbeat thundering inside skull; lungs afire; cramps attacking in earnest now; black patches flickering across vision; clothing dripping, saturated with sweat.

Terry greeted with, "Hello, baby; watcha' *doo*-in'?"; but couldn't spare breath, time to respond.

Threw open side doors, slung victim into own bunk. Then found couldn't reach tool locker door from bedside. Frantic visual search located crowbar on floor near door (had used earlier to enter drugstore). Made long leg, snagged with foot. Dragged within reach of left hand; substituted for right in tourniquet—with relief.

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Stumbled to refrigerator, shaking life back into fingers. Rummaged through stored food; found quart of Gatorade, plastic container of yesterday's chicken soup. Gulped about half Dr. Cade's elixir in single swallow; put away equal portion of Yiddish cure-all.

Worried somewhat over possible consequences: food, drink not easy travelers in stomach during, right after sustained violent exercise. Especially cold. But knew needed *something* immediately to start replenishment after huge energy drain.

Couldn't *afford* collapse then; didn't have *time* for own problems. Victim about to lose leg; plus certainly in shock, doubtless sinking moment by moment. Even if somehow failed to die as direct result of injuries, shock could finish job—would, untreated.

Returned to bunk. Apprehensively called again upon unnatural strength. Found, to surprise, enough remained to lift foot of bunk one-handed; hold elevated while inserting prop (Gel-Coat kit—flameproofing goodies which should have been used to eliminate much drama from rescue). Would have been easier to elevate legs conventionally, with pillow; unfortunately, supine position unworkable due to wound location: Needed victim prone to treat.

Located Daddy's Number Two black bag, saline I.V. kit from medical supply locker. Rooted through bag; found stopwatch, sphygmomanometer. Took pulse, checked blood pressure: Fast, strong, respectively.

Lifted eyelids, flicked sunlight across pupils with hand mirror. Were unequal, nonreactive; plus unmistakable twitching movements: Nystagmus—concussed certainly.

Then froze, transfixed.

All this time—while examining in car, on sidewalk; lifting, dragging about, carrying; attaching tourniquet, checking vital signs—had dealt with discrete anatomical components. Never connected dots; never mentally assembled into whole person. Never *saw* face. Until then.

Was kid. . . !

Little, if any, older than self.

Comprehension dawned suddenly: Had thought was dealing with adult; carrying, in addition to own compact tonnage, perhaps three times again own weight (heft difficult to judge when heart is pure, strength is strength of ten). In fact, apart from peak efforts (unsticking door, traversing flaming moat with piggyback passenger), exertion level hardly more than doubled. Could have accomplished most heroics almost as well without metabolic short-circuit. (Well . . . maybe.)

However, with understanding came chilling realization: Clinical picture even less rosy than first appeared. Healthy blood pressure reading but snare, delusion in child when hemorrhage a factor. Young cardiovascular systems amazingly resilient when challenged; simply pump faster, harder as blood volume diminishes, maintaining adequate pressure the while.

Right up to sudden, catastrophic, final dissolution; total failure.

Viewed thus, pulse rate most disquieting: Suggested important fraction of total blood supply already gone. And quick review of wound confirmed loss

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still in progress, though slowed by tourniquet.

Agonized for endless moments, poignantly aware of limitations of own training; indecision compounded by mental processes blunted by physical, mental fatigue. Knew, of course, what needed doing; but shrank from unavoidable conclusion regarding by whom.

(Granted, possessed requisite knowledge. Inescapable, since Daddy [pathologist or not], one of only two doctors in town, often called upon to perform emergency room care, usually in own home, invariably at odd hours when no one available to assist but Yours Truly. Watched closely then; listened attentively to accompanying lectures. Even, at proud paternal urging, acquired skill at certain limited surgical techniques, practicing on animal cadavers. But had *never*—alone, unaided—so much as placed Band-Aid on *person*.)

However, time—blood—wasting. And own condition now serious impediment to concentration, precision work. (Maybe wasn't burning energy at quadruple usual rate; couldn't know what overload factor consisted of. But knew was exhausted; never experienced such fatigue before.) Nor, without long rest, much nourishment, was condition likely to improve. Which ruled out usefully immediate future. Unless . . .

Weighed options carefully—shuddered. But saw no way out. Closed eyes, directed consciousness inward. Took deliberate, deep breath; held briefly; released slowly, exhausting tension with it. Then—for second time in only minutes—triggered hysterical tap.

Like magic, felt vision clear, hands steady, cramps abate. But not fooled: Heart still hammered; was still fountaining sweat; breathing, though no longer paroxysmal (regular now, slowed to point where wouldn't affect dexterity), still amounted to panting. Condition unchanged: beneath veneer was totally exhausted. Tried not to dwell on probable cost when came time to pay Piper. Hoped benefits of sufficient duration—surely wouldn't work third time.

Took seat on camp stool at bedside. Bent over leg; drew wound lips apart to assess damage extent, severity. Blood volume made visual structure identification impossible. Removed saline baggie from kit; extended I.V. tube; chopped off end. Squeezing bag to provide pressure, used as hose to irrigate, cleanse area. Worked pretty well, but relief only temporary: Adjoining tissues full of slowly oozing bleeders; and at very bottom of gash, visible now, gaped slice in femoral artery, welling gently afresh with each systole, reflooding area with bright red blood.

Which wouldn't do at all; had to see to work. Pondered briefly; then cranked another turn into tourniquet. Uncomfortable about solution: First Law of Tourniquets holds *must* be loosened every twelve minutes; eighteen at outside. Failure to comply results in tissue death downstream, autolysis, ultimately gangrene.

But here question less clear: Two-inch rent in artery wall complicated equation; hydraulic principles demanded concern at least equal to other factors. (Probably more than equal, as continued to debate matter: Blood geysering out through least resistant path certainly of negligible value downstream—and even *if* somehow benefi-

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cial, advantages accruing to leg moot if body to which attached promptly expires as side-effect.)

But knowledge that choice impending if artery repair not completed within time limit acted as incentive to speed work. Fell to: gathered, set out, organized equipment.

Hosed down wound again. Scrutinized closely; breathed sigh of relief: Tourniquet now achieving desired result; arterial flow stopped. Virtually imperceptible seepage remained from vascularity in surrounding tissues, but makeshift lavage spray adequate remedy.

Next juggled odds quickly, unhappily. Time most critical, true; but upon reflection, concluded potential shock consequences justified investing whatever time necessary to start I.V. before undertaking actual repair.

And if Daddy watching from Above, made him proud: Had I.V. inserted, taped in place, saline flowing—all within single minute. (Practice on long-suffering arm simulacrum [paramedic training aid] paid off: found vein first try.)

Performed necessarily abbreviated scrub, using drinking water, soap, finishing with alcohol slosh. Squirmed into rubber gloves with difficulty—not easy, solo, while maintaining asepsis. (Mostly unworried about infection *per se*; Teacher's opinion holds *H. post hominems* immune to known human disease. [But key words, even if Teacher's very own, are *opinion, known,* and especially *H. post hominem* (of which victim surely must be one—but don't *know* that)—and would be humiliating to perform repair successfully; then lose patient to toxemia through preventable gross sepsis.] So within limits imposed by surroundings, did best to adhere to sterile procedure.)

Tore open first packet, containing pre-threaded needle, absorbable fine catgut suture (offered up silent thanks for modern medical technology as did so; would never make good stereotypical female—were *own* life at stake, couldn't thread needle in fewer than twenty tries).

Picked up two hemostats. Stared down into wound. Took deep breath. Seized needle with finely pointed jaw tips of right-hand hemostat. Commenced.

Proved less difficult than feared. Following initial shock (as learned live patients *warm* inside), technical fascination took over, supplanted apprehension; permitted training to emerge, do job properly. Hemostats gripped needle surely; resultant control wonderfully precise, even down in cramped quarters at bottom of wound. Artery cleanly slit; edges straight; stitches went into place neatly, evenly, closely spaced, just as had when practiced similar repair on hog cadaver under Daddy's direction.

(Sure wished had practiced oftener; developed semblance of professional competence, speed—sealing high-pressure artery called for such tiny stitches; so little time remained and seam so long. . . .)

But wasted none glancing feverishly at watch; concentrated on task at hand. Mind already made up, subconsciously at least: would *not* risk boy's life to save leg. True, be nice if managed to save it too—indeed, striving mightily to accomplish repair in time to prevent limb death.

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(Mightily—but not *quickly*; never realized vascular surgery so time consuming.)

For one thing, one-legged comrade poses significant liability in present-day survival-oriented environment. For another, despite pretensions toward calloused pragmatism, must confess to certain esthetic prejudice in favor of physically sound partner—perhaps even, should circumstances so devolve, mate.

(But repair was *taking* so *long*.)

Finally, even granting advantages intrinsic to performing amputation at leisure in Hopkins teaching hospital's modern operating theatre, amidst latest, most advanced medical wonders (who cares—lack even faintest notion of how to operate them), odds slim for patient surviving procedure. Above-knee amputation serious business, truly major surgery; approached with due respect by most veteran of doctors—likelihood of happy outcome, given amateur-level ministrations in procedure so intrinsically fraught, seemed less a question for serious assessment than object of gallows humor.

(But not laughing; was going to find out unless got move on—taking too long!)

And *didn't want to cut kid's leg off!* Even if somehow managed to avoid killing him in process, would never be able to meet eyes without cringing inside. Yes—despite full knowledge that dummy's own maniacal driving brought on disaster; that consequences on his head alone; that own role limited to saving fool life—would still feel guilty. . . .

(Damn!—taking too long. . . !)

Stole glance at watch—at least sixteen minutes gone (guesstimating from crash) and good half-inch yet unrepaired. What to *do*. . . !

Discovered mind not made up after all. Convictions wavered, crumbled at moment of truth. Should continue repair, cross fingers for dispensation from immutable metabolic laws? Or gamble on holding blood loss to tolerable minimum with local pressure now that wound largely closed.

(But how much *is* tolerable minimum—considering losses to present; mitigated by, thus far, just under pint of saline? Further, how effective is local pressure apt to be on femoral spurting—even if wound largely closed?)

Wait. Perhaps another way out. Not cornered—maybe. With luck.

Solution required judicious hemostat placement: Was necessary to grip, pinch together remaining open edges of sliced artery walls with curved jaws; lock handles, sealing shut.

Now could ease tourniquet temporarily, safely . . .

. . . if hemostat secure.

. . . if *stitches* adequate.

. . . if no other significant bleeders in wound.

. . . if abruptly releasing balance of blood supply into previously substantially drained extremity didn't trigger final shock collapse through major blood pressure drop. . . .

. . . if—oh, *hell!* Simply couldn't stand it any longer—released tourniquet, poised to take action as required.

Wasn't. So glad.

Took time then for breather, suddenly aware of first hints of returning fatigue. Peeled off gloves; finished Gatorade, soup.

Removed patient's shoes, socks; in-

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spected toes as circulation resumed. (Should have at outset: Color, temperature key clinical signs to circulation status in leg, foot.)

Sat back, eyes closed, relaxed; breathed deeply, modulating oxygen intake just at fringes of hyperventilation symptoms, hoping to get running start on replacing stores before disintegration set in in earnest. Knew wouldn't really help, but beat waiting idly for collapse—for which *still* didn't have time.

After five minutes, retightened tourniquet, donned second pair of rubber gloves, released hemostat. Lavaged site again, flushing away seepage accumulated from surrounding tissues. Resumed needlework.

And marveled: Delicate stitchery, tiny knots suddenly easy—now that no longer racing clock, impeding own efforts through tight-collar syndrome.

Soon last stitch in place; femoral repaired. Only closing-up chores remained, housekeeping incidentals: rejoining severed muscles, closing skin layers; assembling, installing home-made pressure bandage incorporating splint to prevent knee flexion during initial healing process. Much easier going—nothing life-or-death. And could use larger stitches.

Then followed quick, apprehensive review of own condition. No serious portents detected; so stripped limp body (yes, completely; potentially fastest bleeding tissues on male body concealed by shorts; no shrinking damsel I — besides, modesty lousy reason to lose patient through negligence); examined head to foot, identified additional serious (relative term, this, compared to femoral) lacerations; closed with stitch here, tuck there, bandage where appropriate. Finished by covering with blanket, slipping pillow under head, connecting fresh saline baggie to I.V.

Whereupon, quite without warning, found self face down next to bunk, viewing world through darkening, flickering mists (viewing two worlds, point of fact), while breathing transformed abruptly into agonizing gasps, heartbeat stabilized at tachycardiac level, every muscle in body knotted into single huge cramp. Couldn't even cry out. And *wanted* to.

Could have ended pain by triggering posthypnotic relaxation sequence; but sleep—akin to coma—sure to follow immediately, and couldn't afford yet; important details remained undone:

Van's right-side double doors gaped wide; driver's door hung open, too, just as had left it when leaping out. Knew must remedy before letting go: Bound to be dogs in area (have not forgotten [will *never* forget] dog pack encounter shortly after emerging from shelter); pooches would be pleased indeed to discover van standing open—and ready access to three helpless occupants.

Besides, Terry's water, food dishes not filled since leaving Harpers'; no telling how long oblivion might last. Plus urgent need to stoke own fires before going under; nourishment deficit almost as critical as fatigue.

All of which posed problem:

Body on strike. Brain apparently still operating at what passes for normal function, but commands ignored as burnout reaction intensified, symptoms worsened. Try as might, couldn't elicit so much as purposeful twitch from any

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voluntary muscle, even unto least finger.

Too busy twitching *in*voluntarily; spasming, in fact: Body jerked, convulsed, shuddered in response to multiple random cramps attacking, releasing, attacking again from head to toe. Ravages flopped body about like chicken recently deprived of head (uncomfortably apt simile; brain quite as unable to communicate with body as if physically separated).

Thrashed for timeless, endless interval. Several seconds at least. Then subsided into gently quivering heap, face up, limbs intertwined in Gordian disarray; cramps abated, muscles relaxing, going limp—pain easing toward residual ache. Would have sighed with relief if such possible, but breathing not among voluntary functions then.

Besides, knew relief was only fool's paradise: could feel heat; knew face was flushed. Could feel perspiration volume increasing, sweat streaming from entire body; dripping where possible, collecting in hollows elsewhere—one pool quickly threatened to overfill valley formed by nose, cheek; invade eye. And breathing rate such that nose began to run.

Suspected was not pretty sight. But not encouraging to realize Terry, intently peering down from stand, actually had nothing to say; just made big, round, worried eyes; stared first one eye, then other. And *know* what it takes to dismay my brother.

But worry surely nullest of exercises. Understood problem; knew only solution was food, sleep. And knew *must* finish chores first.

So again turned perception inward. Concentrated. Groped for *ki* within soul. Felt it stir. Created channel, felt flow begin. Gently guided into right arm. Willed dead meat to move.

Terribly pleased to note response. And not a little amazed.

Expanded control zone. Levered body into sitting position; then rolled over onto hands, knees. Moving most carefully (nothing worked without painstaking, step-by-step supervision), crawled forward to driver's seat.

Where paused momentarily, mulling options, calculating odds. Shortest route involved climbing into seat to reach door handle. But never seriously considered as solution (as well might have been mountaintop). Or could go around; between seats, past engine cover, under steering wheel. Farther to travel. But level.

Even so, had to stop en route, rest. Twice.

Eventually, however, fingers closed limply around door handle. Marshaled forces for effort—pulled door shut hard enough to secure latch. Barely. (Noted, gratefully, front windows rolled up far enough for safety; all others swing-out construction, couldn't open far enough to pose security risk.)

Then—somehow—managed to turn around under steering wheel, avoiding getting snagged on pedals in process; set off on return trip amidships.

Arrived in due course within reach of side door handles. Again assembled energies (what remained), swung doors shut—even remembering to close in proper order: rear first, then front, so overlapping latches engaged instead of rebounding, negating efforts. Experi-

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enced profound thrill, sense of accomplishment, from having done it right.

Considered taking brief time-out for rest but realized wouldn't help. So heaved self upright on knees, ignoring tendency for surroundings to orbit own vertical axis. Scooped up saucer full of parrot seed mix from container on counter; lumbered (still on knees) to stand, prepared to dump contents into sibling's food cup.

And stopped, confused: was full. As was—now visible at far end of perch — water cup.

Set down saucer carefully. Tried to think problem through, but not easy: data input too fast; of such anomalous, almost contradictory nature; mind functioning so slowly. Shook head—regretted at once: no one in such condition should move head quickly. Ever. Pain obscured vision momentarily. When receded, found self leaning against side doors, head resting against window glass, eyes closed.

Solution obvious, but reached only after labored deliberation: of course food, water untouched: Had embarked from Harpers' this morning—several lifetimes prior—*something under an hour ago!* (Indeed, Albert knew whereof spoke: Time *is* relative; truly flies when having fun. . . .)

Probably smiled as arrived at conclusion. Which expression surely faded as eyes opened, focusing on glare from holocaust surrounding Trans Am, mere hundred yards behind van. Building in which vehicle embedded now well involved: smoke, fire gushing from windows many stories up, obviously spreading rapidly.

And given shoulder-to-shoulder nature of downtown concrete-canyon architecture, only matter of hours before entire block ablaze—in fact, as flames gutted high-rises, structures' collapse sure to follow; filling, bridging streets with burning debris, spreading conflagration from block to block. Only few more hours before entire city engulfed in fire storm.

Implications percolated slowly but with finality: knew taste of defeat. Truly bitter—age-old cliché accurate, but woefully inadequate.

Not that had given up. Though slowed, dulled, mind still functioning more or less coherently; knew if passed out now would never wake: Van's destruction, together with frail contents, guaranteed as blazing walls crashed down to fill street where parked.

But problem deeper than mere awareness of threat, unflagging resolve. Body pushed too far; was finished: utterly in grip of fatigue-toxin-overdose-induced myasthenia-like collapse, paralysis. Not a single cell from voluntary musculoskeletal group responsive to brain's commands—doubt house-current application would have elicited so much as twitch.

Tears began to trickle from under lids as eyes closed, body slid limply down door, crumpling onto floor to lie unmoving. Final thoughts were fading jumble fuzzy with disappointment, regret, outrage: Had come *so* close; felt so *cheated*—

"Hel-*lo*, baby. . . !" wailed Terry in anguished tones.

—and horror: Hoped smoke, fumes, big piece of falling debris would find us before flames; couldn't bear thought of retarded twin, gorgeous feathers

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ablaze, rolling about floor, struggling, screaming. . . .

Waking was nice: gradual, luxurious process, allowing time to revel in same cozy lack of urgent purpose which always attended first awareness on summer mornings during school vacation. Bed was lovely: firm; made up with cool, clean-smelling sheets; light, soft blanket. And from somewhere floated lilting chords of Beethoven's *Pathétique* sonata.

Once got around to opening eyes, saw that surroundings comprised large, cheerful, well-appointed bedroom, simply reeking of restrained good taste.

Had no idea where might be, how got there, or why; and didn't much care. Was sufficient that felt marvelously rested, deliciously comfortable—until essayed first lazy stretch.

Accompanying yawn brought cognizance of tube up nose; a discovery so startling, almost distracted from surprise of learning right arm immobile, apparently strapped down. Deliberate swallow confirmed tube also present in esophagus. Unpleasantly so.

Followed tube with eyes to bottle hanging on stand at bedside. Didn't need to read label to recognize Isocal HCN, first choice among medical community for endogastric feeding of comatose patients.

And next to Isocal hung partial baggie of Ringer's lactate—saline with electrolytes added. From it ran tube to I.V. —plugged into right arm.

As pondered these phenomena (with rapidly dwindling enthusiasm), yet another anomalous sensation intruded amongst already churning thoughts. Or perhaps *lack* of sensation more accurate: For first time in living memory, had awakened without awareness of overfull bladder. Which realization flowed without pause into dawning perception that Something Was Amiss in *that* region as well.

Began immediate left-handed exploration to determine quality, extent of damages. Was dismayed to learn attire consisted of overlarge (knee-length) T-shirt—and *diaper*. . . ! Complete with safety pins. And, speaking as expert baby-sitter, quite professionally executed. (Strategically located slit in crotch of mortifying garment admitted [as suspected] Foley catheter.)

Further exploration revealed substantially absent eyebrows, lashes, head hair appreciably shorter in spots then remembered it. Had obviously been brushed out, breaking off scorched, shriveled ends—

Oh! Memory returned in bewildering rush. Bringing with it sudden dread, rampant curiosity: *Where was Terry?* What about *kid?* What happened? More particularly, *who* happened it?

Reasonable questions, to be sure. When last participated in events, score was Candy zero, Grim Reaper nine—in ten-point game. Lethal probabilities abounded; situation, without exaggeration, dire.

Known on-site cast included Terry; concussed kid (with stiff leg, profound blood loss, stitches all over hide); and, of course, Yours Truly—plucky neighborhood zombie. Terry didn't get us out of fix; get me cleaned up, plugged in, plumbed, drained. *I* sure didn't—and kid was . . .

No! Enough . . . Without facts, spec-

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ulation worse than nonproductive; downright *maddening. . . !*

Had to find out for self—couldn't lie quietly in bed, waiting for someone (*whoever!*) to walk in, in own good time, and fill in blanks (selectively—telling patient "only what's good for her"). Had to know—*now. . . !*

Doggedly returned to self-examination. Found tender areas of pinkish skin of forehead, hands, ankles—another few seconds and would have been serious burns. Determined all muscles, while weak, again responded to wishes. (Almost unbearably relieved: Daddy had recited cases where muscle overuse resulted in permanent burnout.)

Concluded, at length, was sound enough to dispense with life-support toys; return to transacting personal business personally. Could eat faster, absorb protein, calories more efficiently orally then through tube (certainly enjoy it more). Further, examination demonstrated no clinical evidence of dehydration; no point, then, to retaining I.V. And could damn well go potty myself!

Okay, no reason couldn't get up—just matter of unplugging tubes. (Straightforward sounding, simple statement of intent: Easy to say.)

Effectuation, however, less so. Sensations accompanying do-it-yourself nasogastric tube removal unlikely to find place in catalog of experiences without which life is not complete. Same for catheter. Neither truly painful coming out. Actually. Exactly. Quite. But felt *horrid. . . .*

I.V., on other hand, did hurt. But over quickly; slight bleeding stopped immediately with momentary pressure.

Then addressed question of standing. Knew was weak, but fairly certain could manage. With care, slowly, taking very short steps.

Question of very short steps, however, proved premature. Spent appreciable interval sitting on edge of bed, head between knees, waiting for room to stabilize. Which did, eventually.

Whereupon, gingerly stood, paused briefly to verify balance in working order; then employed self-same care, very short steps, to navigate slowly to door.

Hall in which found self was higher-ceilinged, wider than those in houses which constitute experience during formative years. Décor, too, beyond what have come to recognize as norm.

Piano now into first measures of unfamiliar solo transcription of Wagner's *Rienzi* overture. Stood briefly, listened.

(Daddy included in shelter collection essentially entire Andre Perrault international catalog; record collection upstairs in house almost equaled. Had myself spent important fraction of short life exposed to, absorbing, enjoying classical music. Plus Daddy once took me to Horowitz concert in Chicago, where, in three too-short hours, artist demonstrated all he'd learned about playing piano over perhaps seventy-odd years of training, practice, dedication. Have, despite youth, acquired discerning ear.)

This pianist was good. Possibly even *that* good. But didn't recognize touch. Wondered who might be; when recording made.

Followed music down hall to balcony—from either end of which descended wide, sweeping staircase (of sort on which Cinderella lost slipper), arriving in foyer into which Daddy's

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whole house would fit without crowding (if tucked to side to miss chandelier).

Glided down nearer staircase, feeling like figure in dream. Music coming from partially open door on far side of foyer. Crossed room, silently pushed door open.

Terry's tee stand stood next to gleaming ebony concert grand at center of library/study whose shelves held books in numbers rivaling perhaps even Daddy's shelter library—and all hardbacks, most leather. Harebrained sibling himself (*alive!*) relaxed on one foot, raptly watching, listening as my erstwhile patient, leg bandaged but now unsplinted, played and music flowed through room, filling heart, crumbling barriers behind which had thought *those* emotions safely locked away forever.

Moved silently into room; held out arm. Twin's eyes snapped wide; almost leaped in eagerness to swarm aboard. Settled in chair just behind, to side of oblivious musician. Terry discharged immediate hysterical gladness over reunion through series of head dives, cheek rubs; then snuggled down in lap, pressed close, sighed, closed eyes. Held my baby brother tight in arms.

And, soundlessly, cried. Cried for Momma, for Daddy; for unknown, unremembered flesh-and-blood parents; for Teacher; for all my friends; for acquaintances; for whole world of strangers—cried for all *dead*.

Cried for Terry, miraculously alive when should have burned to death. Cried for boy—*ANOTHER PERSON!*—incredibly still alive in spite of crash, terrible wounds, my bumbling treatment, fire—sitting now at piano, playing as composer only might have dared to dream.

Cried for me—for grief, for relief, for joy.

Cried for past. Cried for future. Cried for hope. . . .

Cried while boy finished *Rienzi*, swept into Rachmaninoff, Chopin, Brahms, many others; all from memory, most full orchestral works somehow transcribed for piano alone; all played as if keyboard itself were come to life, complete with soul demanding outlet, expression.

Boy finished Berlioz's *Symphonie Fantastique* with marvelously cacaphonic climax whose violence quite made up for missing orchestra; tiptoed with startling gentleness into Pachelbel's *Canon in D*. And into resultant sweet tranquility he spoke; voice low, tightly controlled: "I thought you were dead."

Didn't reply—correction: Couldn't.

"Terry woke me trying to rouse you—he and I have become friends waiting for you, and I've had time to read your journal. He was down from his stand, scrambling all over you, flapping his wings, pulling at you desperately, nuzzling you, screaming at you. That's what woke me up."

Lapsed into silence for long moments, music flowing without pause. "The whole block next to us was in flames. The heat was incredible and wreckage was coming down all around us. The street was filling up with burning debris and the building on the other side was starting to go as well—it looked like something out of an old movie of London during the Blitz."

Again fell silent, moving bandaged leg restively, but music never hesitated.

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"I had a hell of a time getting into the driver's seat with my leg in that splint, not to mention maneuvering the I.V. hose and pouch; and I knew I'd better leave it in place—I was weak as a kitten, and the blood all over the place made it obvious why. Finally I hung the I.V. pouch on the rear-view mirror, stuck the leg out the window, and used my right leg to drive. It wasn't easy, shifting an unfamiliar transmission without using the clutch. I don't think I hurt it.

"I got us out of there and came home. I thought you were dead." Music soared gently, filling lengthening silence with beauty, while boy's breathing rate mounted visibly, settled gradually. Only quarter profile visible from own vantage, but wet cheek's glint unmistakable. Yet when resumed, voice was still almost conversational.

"You *looked* dead. You were grayish-white and you didn't appear to be breathing at all. Terry wouldn't let me touch you at first; he crouched on your body, wings half spread, feathers fluffed to make him seem three times life-size, neck outstretched, that huge hooked bill open and threatening, and making a *noise* in his throat that . . ."

Voice trailed off, but fingers never faltered.

". . . that reminded me of the sound my mother made when she found my father's body. He was the first to go in the plague." Tendons stood out in neck, but music continued unbroken.

"I thought you were dead; so I concentrated on trying to comfort Terry, soothing him, getting him to accept me, to come to me. Only after that was I able to attend to you—and notice that you were still perspiring. I had never heard of a dead person perspiring—I've never seen anyone *sweat* like that—so I brought you inside, got you cleaned up, and put you to bed.

"You were running an astonishing temperature for a live person—the books I've read suggest that people don't survive at 109 degrees, and it didn't seem very likely that you'd manage it much longer—so I packed you in ice and started an I.V. to put back some of that water sluicing off of you. I wired you to our EKG—

"Oh, yes, we have a fully equipped emergency room here in the house. This was the kind of neighborhood, back when I had lots of fussy, hypochondriac old neighbors and relatives, where one couldn't afford to be without one; it would get you talked about, at the very least, and more likely disinherited. All the house staff were required to be fully conversant with the use of all the equipment, just in case.

"And while there was a stigma attached to people who possessed those skills—menial work, you know, performed by the 'servant class'—and even though I've never been sick in my life . . ."

Bingo! Heart skipped a beat—*never been sick. . . !*

". . . I judged that it was the sort of thing that might well come in handy someday. So I kept my eyes open—and bribed several of our retainers, incidentally—and became a pretty fair EMT, if I do say so myself. But *you* . . ." Narrative faltered again; music bridged gap as breathing discipline labored to restore control.

"You were my valedictorian exercise." Declaration followed by long

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breath, uninterrupted music. "Keeping you alive called for everything I learned from our staff, extensive study on my own, and more luck than anyone has a right to expect—yours or mine, I'm not sure.

"You were a mess."

"Thank you." Blurted reply after boy's last four words but before content registered. Experienced momentary pang of dismay lest he take it wrong, be offended. How could he know how slowly own thoughts functioning; how far behind utterance comprehension lagged.

But mattered not. Hadn't heard. Probably not listening at all; wrapped in own thoughts. Monologue continued without pause:

"Your heart stopped twice. The first time I managed to restart you with CPR alone; the second time it took three jolts with the defibrillator paddles and an injection of adrenalin directly into your heart. *That's* something the staff didn't teach me. . . ."

Without bidding, hand drifted to chest; fingers sought, found tiny bandage just to left of sternum, between fourth, fifth ribs.

"Between the ice—courtesy of the industrial grade icemaker in the bar in the ballroom—and the I.V., I got your temperature back down somewhere near normal and restored your fluid level. That took most of the rest of the day.

"But still you were fading almost as I watched. For some reason your tissues apparently were consuming themselves, as happens in extreme starvation, but faster—which made no sense to me as you were in good flesh and apparently healthy otherwise. So I intubated you gastrically and started you on the Isocal. And to save time, to start nourishing your cells immediately, without waiting for you to metabolize the Isocal, I briefly piggybacked a filtered solution of it into your I.V. and changed you from straight saline to Ringer's.

"Fortunately, I had to answer Nature's Call myself at about that time, and that started me thinking: All that fluid had to go somewhere. You had stopped perspiring; logic offered but a single alternative: If your sphincter held, you would rupture your bladder.

"So I catheterized you. Yes, that's something else the servants didn't teach me. But according to the book, I probably did it correctly—you didn't bleed and haven't shown signs of infection.

"And you confirmed my suspicion promptly by filling the first container in a single nonstop gush. I had to mop the floor after fumbling the container change on the fly.

"You probably don't want to hear the details of how I coped with your bowels; but I can attest that you were marvelously regular until you emptied out what you had eaten before and were down to the Isocal residue; of which—I'm glad to say—there's almost none. But that's why you're in a diaper. And I've been transferring you back and forth between two beds as clean-up demands necessitated changing them. And you."

Shook head, almost shuddered, but music never wavered. "Ever since I attained puberty and learned what it implies, my primary ambition regarding girls has revolved around getting their clothes off. Et cetera. That has not been the case with you; I'm not into necrophilia, and a catheter is not conducive to romance: There was no 'et cetera.'

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"And though I have acquired an exhaustively detailed, painstakingly thorough, unflinchingly intimate familiarity with your very tangible aspect—in fact, learned more about you physically than any girl in my experience—I must admit that I would have traded gladly every success I've enjoyed in the past in that respect at any moment during these six days for the privilege of getting you dressed. You have not been a fun date."

Can't say just when lost track of soliloquy; drifted off into own blissful, music-filled reverie. Didn't have to listen; details irrelevant—had *found* somebody. . . ! Months of accumulated desperate tension drained from soul like sand spilling from ripped sack, leaving slightly limp, giddy euphoria suffusing entire being. Wouldn't have been surprised had started glowing from head to foot. Was supremely happy.

And not without degree of justification—not leaping to conclusions; some data in already (sketchy, obviously preliminary, but [beyond mere fact of his *being*] encouraging): Appears to be good prospect. Hominem beyond doubt; obviously intelligent (piano talent alone points toward genius-level intellect; and when coupled with resourcefulness displayed in keeping me alive, plus syntactic evidence apparent from first words, leaves little room to doubt quality of brains). Further, demonstrated gentlemanly instincts. Additionally, sound physical specimen, apart from wounds (apparently healing nicely); with pleasant, well-bred features. Finally, was good to helpless birdbrain, and idiot twin *likes* him (Terry spends bulk of waking hours rowing with only one oar in water—but is *never* wrong about people).

Not perfect, of course: Will be period of adjustment; may require gentle retraining (at bare minimum, driving habits need attention!).

But issue not impending. "Ever-after" is long time, and too young now myself for twosome involvement; while boy (implied conquests notwithstanding) hardly year, two years older. Question resolvable at leisure, without deadlines.

Because *doesn't matter now. . . !* Teacher was right—*really are other people out there. . . !*

Hominems—*my* people! Perhaps 150,000, according to Teacher. Maybe more, maybe less—who cares!—numbers immaterial. . .

Are others!

And we're going to find them.

Together. . . . ■

● In a direct confrontation with superior creatures from another world, the reins would be torn from our hands and we would, as a tearful old medicine man said to me, find ourselves "without dreams," that is, we would find our intellectual and spiritual aspirations so outmoded as to leave us completely paralyzed.

Carl Jung

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David R. Palmer

It's not everyone whose first story sale not only appears in *Analog*, but reaches the final Hugo Award ballot! David R. Palmer managed this feat with "Emergence," which appeared in the January 1981 issue. So popular was it that readers nominated it one of the top five novellas of the year. (It eventually lost the Hugo to another *Analog* story: "The Saturn Game" by Poul Anderson.)

Strangely enough, Dave thinks he could have written a better story. Since he feels a more capable writer now that he's sold additional stories, he intends to rewrite the novella and incorporate its sequels, including "Seeking" in this issue, into a complete novel. Well, Dan Keyes expanded "Flowers for Algernon" from a shorter work into a novel and it got better and more award-winning. And then, of course, there is the example of *Childhood's End*.

Dave belongs to that subset of authors who are compulsive rewriters, sometimes recasting a single sentence 50 or more times. This is a creative process more common to poetry than prose, and perhaps Dave is creating Art like a sculptor whittling away at a block of stone until the form emerges from within. Even for a writer with Dave's natural speed, this is a slow process.

He has had some of the types of jobs not uncommon to writers—bookkeeper, auto mechanic, salesman, pet store proprietor, truck and bus driver, typesetter—before settling into a current occupation that is probably singular among science fiction writers: Certified Shorthand Reporter in Florida law courts. His wife is also a court reporter; she first attracted his attention when he noticed her reading a Keith Laumer story. Dave started writing to set down a complicated daydream evolved to escape the boredom of his first job. He likes "fun" stories about likeable people, with happy endings.

He lives in the Gainesville area, coming originally from a suburb of Chicago. Such Floridian pastimes as swimming and skin diving interest him, along with parrot raising, but his real passion is for mad inventing: he built and raced a Formula Vee car; now on the drawing board is an airplane. It's always hard to tell just how far a new writer will go, but in Dave's case you can bet he will get there very fast. ■

Jay Kay Klein's biolog

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John G. Cramer

NEW PHENOMENA

One of the most delightful things about the physical sciences is that every year or so a new phenomenon comes along which "doesn't fit." The best of these are experimental results or observations which are completely unanticipated by contemporary understanding and without precedent on the basis of established theory or past results. Perhaps half of these reports of new phenomena turn out to be wrong. The recent "discoveries" of magnetic monopoles in Berkeley, of superheavy elements in Tallahassee, and of cosmic-ray "quarks" in a cloud chamber in Australia are notable examples of reported discoveries which failed to withstand close examination.

However, while some "discoveries" have been found to arise from instrumental problems or from unduly optimistic analysis, there are others such as the Mössbauer effect (Mössbauer, Nobel Prize, 1961), the CP violation of the K_2° meson decay (Fitch and Cronin, Nobel Prize, 1980), or the observation of the 2.7° radiation from the Big Bang (Penzias and Wilson, Nobel Prize, 1978), which have turned a field on its head and demanded a thorough revision of current ideas to accommodate the new phenomenon.

Among experimental physicists, this is the Mother Lode, the Holy Grail, the payoff for a lifetime of all-night runs, lavish attention to minute experimental detail, and plain hard work. The chances of a given group of scientists making such a discovery are, of course, very small, and there are no guaranteed paths to such discoveries. Not even the most carefully planned experimental program is assured of striking the "pay dirt" of a new result. Nevertheless, it is the *possibility* of finding a new phenomenon which provides a sizable part of the excitement and intellectual stimulation of experimental science and which compensates for the long hours and the less-than-you-could-get-as-a-plumber pay scale.

This article describes three experimental/observational results which *seem* to qualify as "new phenomena." Each of them has already been around for a few years, first as a suspected "glitch," then as an un-understood result which has stubbornly refused to go away. Any of these results may yet prove to be spurious, but they also have the potential for causing revolutions in their respective fields. These phenomena are (1) the discovery at Stanford of "something" having only a fraction of the charge of an electron, (2) the observation at

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Berkeley of "accident-prone" fragments of nuclei with five or so times the normal chance of collision, and (3) the observation by several groups of radio astronomers of objects which appear to be moving faster than the speed of light.

I. Quarks in a Jukebox?

Fifteen years ago the theoretical physicist Murray Gell-Mann of CalTech suggested that there might exist a new kind of fundamental particle which he called a *Quark*. These new particles were supposed to have the peculiar property of *fractional charge*, in that they would have only 1/3 or 2/3 of the electrical charge of a proton or an electron. They were supposed to be the constituent particles from which all of the heavy particles previously considered to be fundamental (protons, neutrons, π mesons, etc.) were constructed.

This prediction set off a veritable gold rush among experimental physicists to try to discover the first free or "bare" quark. They tried to produce quarks with high energy particle accelerators, and while they saw evidence of quarks *within* neutrons and protons, they saw none in isolation. They tried to find quarks which had been produced by cosmic rays. They looked for quarks in the material of "beam stops" from large accelerators. They tried to find quarks attached to oil drops. They looked for quarks in oyster shells, in nodules from the bottom of the ocean, in the sewer sludge of the city of Chicago. And they didn't find any bare quarks anywhere by any technique.

After this plethora of negative results, theoretical physicists began to devise reasons why nobody *should* find any bare quarks. At first they said that perhaps the quarks were just too heavy and therefore required too much energy to make. But that idea didn't fit the facts. So they came to the concept of *quark confinement*. The gimmick here is that the force which sticks quarks together to make protons and mesons, the so-called color force, is so strong and so long in its range of influence that when you try to pull two quarks apart you have to put in enough energy to make two more quarks. So each of the two original quarks which you have separated now has a new quark stuck to it, and they aren't really separated at all.

The concept of quark confinement is now generally accepted by physicists and is the basis for the new field of Quantum Chromodynamics, a self-consistent theory of the color-force interactions of quarks and the ways in which they combine to produce the "old" fundamental particles and their properties. This theory has been able to explain a large body of previously undigested facts in particle physics. Its success has produced a great deal of confidence among physicists that quarks are indeed confined and that no one will ever be able to find a bare quark lying around.

However, there is an unsightly fly presently resting atop the lovely confection of quantum chromodynamics, and it was placed there by Professor William Fairbank of Stanford. Fairbank and his collaborators, like a number of other groups of experimental physicists, set out some years ago to look for particles of fractional charge. The technique which they devised is a greatly improved version of the famous Milli-

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kan Oildrop Experiment. They place small spheres made from the element niobium in a magnetic field. These spheres are cooled to near absolute zero and become *superconductors*, i.e., perfect electrical conductors. A superconductor has the property that it will not permit a magnetic field to penetrate its volume. It generates an electrical current on its surface which nullifies the interior magnetic field. The external effect of this superconducting current is to push against the external magnetic field. This can be used to make the superconducting sphere "float" on the magnetic field, with the magnetic force exactly cancelling the force of gravity.

This magnetic levitation permits Fairbank and his group to measure the electric charges on the spheres by observing their motion while pushing on them with an electric field, causing them to vibrate in a way which depends on their electric charge. The group has developed a sort of "jukebox" which will remove a selected niobium sphere from a storage rack, place it in the magnetic field, and set it into an oscillating "dance step" which measures its charge. They now have several spheres which *consistently* show a measured charge of 1/3 or 2/3 of an electron's charge. They can demonstrate this result repeatedly, alternating the fractionally charged spheres with those having normal integer charges.

This result was first announced several years ago and was met with great skepticism. However, the group has persisted and now has very convincing evidence that they are observing something which gives at least the appearance of fractional charge. As with many scientific results, this one does more to raise questions than to provide answers. Are they seeing quarks? If so, why aren't the quarks confined? Why are not the effects of the "color force" seen? If they are not observing quarks, then what are they seeing? Some instrumental effect?. Another, previously unsuspected particle which is not a quark but which has fractional charge? As we sometimes say in Physics, "This result has very far-fetching implications!"

II. Accident-Prone Nuclei

When an atomic nucleus moving with a sizable fraction of the velocity of light strikes solid matter, it rapidly loses its large velocity through a series of collisions with atoms of the material. These "atomic collisions" knock electrons loose from one atom after another, causing the fast nucleus to slow down in the process.

Occasionally there is another more violent event called a "nuclear collision," in which the fast particle makes a direct hit on the nucleus of an atom. This produces a far more dramatic result. Both colliding nuclei literally fly apart, producing fast and slow "fragments" in a variety of sizes. This happens perhaps a million times less frequently than an atomic collision, because the nucleus of an atom presents a far smaller target and is therefore harder to hit than the diffuse cloud of electrons surrounding the nucleus.

Cosmic rays are super-energetic fast particles and nuclei which come into our atmosphere from the depths of space. Some years ago, physicists reported a very interesting but elusive effect in the nuclear collisions produced by the weak

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heavy-nucleus component of cosmic rays. They had been using photographic emulsions carried by high altitude balloons to study the "history" of collisions between the fast cosmic ray particles and the silver and bromine atoms of the emulsion; as the collision products show up as dark "tracks" when the emulsion is photographically developed.

The cosmic ray particles passing through the emulsion typically show a track of atomic collisions punctuated by an occasional nuclear collision. Nuclear fragments arising from the breakup of the colliding nuclei appear as a "fork" in the track. The cosmic ray physicists reported on a number of occasions (first in 1954) that there appeared to be something strange going on immediately after a nuclear collision. The pieces of the original fast nucleus appeared be much more "accident-prone," to be much more likely to have *another* nuclear collision in the next centimeter or so of the track. Because these cosmic ray experiments had provided only a few measured collisions to support this observation, however, the result was not taken very seriously.

Recently a group of nuclear physicists led by E.M. Friedlander and Harry Heckman of the Lawrence Berkeley Laboratory and cosmic ray physicist Barbara Judek of Ottawa decided to try producing the same effect artificially by accelerating heavy nuclei in a particle accelerator instead of waiting for them to come "naturally" as cosmic rays. They accelerated oxygen and iron nuclei to very high energies in the Bevalac accelerator at Berkeley, so that these particles were travelling at 95% of the velocity of light. They then allowed these fast nuclei to strike the same kind of emulsions which had been used in the cosmic ray experiments. And they observed the same "accident-prone" behavior in the fast collision fragments. There was a definite increase in the occurrence of further nuclear collisions in the next few centimeters of track immediately after a nuclear collision "fork." This time the effect was observed in 1,460 events, and so was convincing even to most skeptics.

The analysis of their data shows that about 6% of the time the fast fragments from the collision, which are pieces of the original fast nucleus, appear to be in some peculiar accident-prone "state." These nuclei are about five times more likely to have another nuclear collision than are the same kinds of nuclei moving with the same speeds through the same material when no previous collision is involved. The group has estimated that this "accident-prone" condition persists for about 10 picoseconds (10^{-11} seconds) before the nuclei return to more normal behavior. This result cannot be explained in terms of our present understanding of nuclear physics.

Since the forces between nuclei are very short in their range of influence, the pair of colliding particles must be essentially "touching" on a nuclear scale before they even "notice" one another. Therefore the probability of scattering depends directly on the sizes of the colliding nuclei. But a nuclear fragment, even in a very highly excited and energetic state, has never been observed to change its size by even a frac-

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tion of a percent. Therefore, a change in the size (or cross-sectional area) of a particle by a factor of five is unacceptable as an explanation.

The only other simple explanation of this effect is that the *range* of the force between the particles has somehow become larger, and that the particle fragment is colliding with nuclei which are some distance away rather than "touching." There is no known force in the universe which can produce this behavior. Perhaps we are on the threshold of discovering a new force.

III. Faster than a Speeding Sunbeam

A large fraction of all science fiction stories and novels involves, at least incidentally, some way of travelling faster than the speed of light. The need of the authors for this device is quite understandable. The universe is a far more interesting place when one can travel from one region of it to another in less than a lifetime. But the question which remains is, "How can faster-than-light travel be accomplished?"

The gimmick used in a SF story might be a space warp, or a detour through hyperspace where the speed limit is higher, or a quick orbit around a black hole and through a "wormhole" connection to another part of the universe, or conversion of the space ship into tachyons and back, or it might be simply some *de facto* FTL drive which allows you to go from Point A to Point B in the universe without having to travel below the "statutory limit" of one light year per year. While most of these gimmicks were borrowed from physics, at the moment physicists know of *no way* of producing FTL travel and can tell you a number of reasons why it is impossible. Therefore, the new result described here, an apparent violation of the light-speed barrier, is likely to create great excitement for physicists and science fiction readers alike.

The light-speed limit is a very difficult speed limit to violate because, according to Einstein's Special Theory of Relativity, it must hold not only for material objects (like protons and spaceships) but also for the speed at which information or messages can be sent from one place to another. Special Relativity implicitly forbids not only *travel* faster than c but also *communication* faster than c.

The reason for this limit on information speed is that if a message could be sent even slightly faster than the speed of light, then physical laws would not be the same in all non-accelerating "reference frames." This is true even if the message were hand-carried aboard a spaceship travelling through "hyperspace" under "warp-drive"! The reference frame lingo mentioned above refers to any system in which an observer is moving with a fixed speed (or not moving at all) and in which he might decide to make some physical measurements. This identity of the laws of physics in all non-accelerating reference frames lies at the very foundation of Special Relativity and seems to be on a very firm experimental foundation.

Among the many phenomena of Nature, however, one *can* find apparent violations of the light-speed limit. For example, radar waves travelling down a kind of rectangular pipe called a wave guide will travel so that their wave

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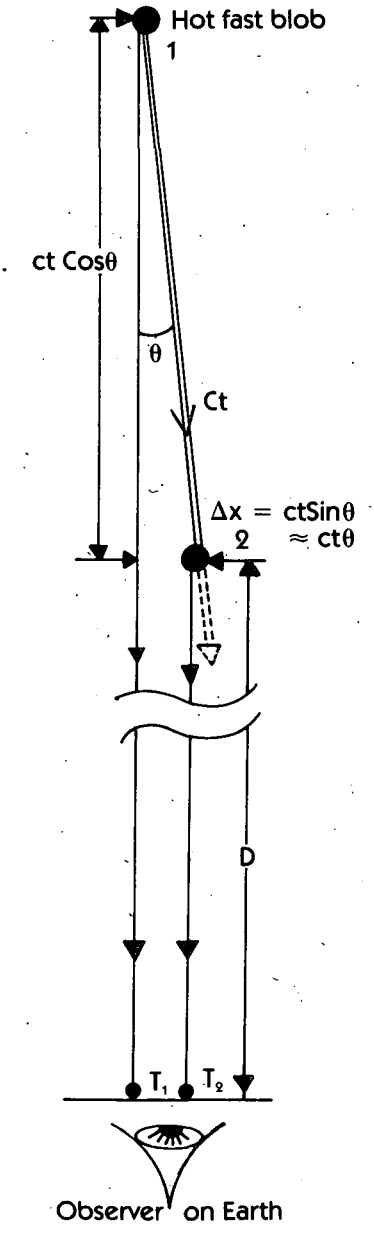

Apparent velocity of superluminal objects

Consider a very hot object which has been ejected from a quasar so violently that it is travelling essentially at a velocity V = c. At time T = 0 it emits a burst of light at position 1, which travels to the eye of an observer on Earth. It then travels at a slight angle θ to the Earth line-of-sight and at time T = t it emits a second burst of light at position 2, when it is a distance D from the Earth. The time required for the first light burst to reach the Earth is $T_1 = (ctCos\theta + D)/c$ and the time for the second burst to reach the Earth is $T_2 = t + (D/c)$. To the Earth observer, the object appears to have travelled a distance $dX = ctSin\theta$ in a time $dT = T_2 - T_1$. Therefore, its apparent velocity is $V = (cSin\theta)/(1 - Cos\theta) \approx 2c/\theta$ (using the small angle approximation for θ in radians that $Sin\theta \approx \theta$ and $Cos\theta \approx 1 - \theta^2/2$). So the apparent velocity is: $V = \Delta x/\Delta T = ctSin\theta/t(1 - Cos\theta) \approx ct\theta/\frac{1}{2}t\theta^2 \approx 2C/\theta$. Therefore, if we make θ small enough, we can make V as much larger than c as we like. This works (but is somewhat more complicated) even if the hot object is moving with a velocity somewhat less than c. It is also somewhat more complicated when one considers some of the relativistic effects, but the above derivation is essentially correct.

fronts actually move faster than the speed of light. Physicists call this the *phase velocity* of the waves. The phase velocity easily can be made greater than *c* under the proper conditions. But due to a conspiracy on the part of Nature, this phenomenon and other similar ones *cannot* be used to send messages (or material objects) at speeds faster than *c*. The message always travels with a speed called the *group velocity*. This is the speed at which, for example, dots and dashes of Morse code superimposed on the waves would travel. A group velocity greater than *c* has never been

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observed, even when the waves carrying the message travel faster than *c*. This leaves the would-be violator of the light-speed limit completely frustrated.

In recent years, there has been some discussion among theoretical physicists of another faster-than-light possibility. It was recognized that the relativistic equations describing the motion of physical objects have faster-than-light solutions which appear to give a consistent description of some most peculiar "objects." These hypothetical objects have been given the name *tachyons*. If tachyons really existed, they would have the property of *always* moving at speeds greater than *c* and of slowing down (and approaching *c*) as they were given more and more energy. Operating on the principle of modern particle physics that "everything which is not forbidden is required," some experimental physicists have decided to take the idea of tachyons seriously enough to begin experimental searches for them. These searches have so far yielded uniformly negative results, however, and some fairly convincing arguments have been made which demonstrate why, if tachyons did exist, they could have no interactions with more normal kinds of particles like protons and electrons.

But the most provocative indication that perhaps the light-speed barrier may have a crack in it comes from the cumulative work of radio astronomers over the last decade. The most distant visible objects from the Earth, in the opinion of most astronomers, are the *quasars*. They are relatively small objects which are moving very rapidly away from us and which, for some unknown reason (black holes converting matter to energy?), are emitting the enormous amounts of light energy which allow us to see them with large telescopes despite their great distances. Quasars have been carefully observed since the late 1960s, both as visible objects and as sources of radio waves.

Their detailed study as radio wave sources is made possible by the technique of "long-baseline radio interferometry." This involves the simultaneous use of several radio telescope antennas at widely separated locations around the world, adding up the signals from all of these to study radio sources which are very close together. It provides extremely precise information on the relative positions of radio wave sources within the object being observed. In this case, the technique indicated that the quasar 3C 345 had two distinct radio "hot spots" which were the sources of its radio emissions. Persistent observation of these hot spots from 1969 to 1976 revealed that the separation of the two source points was rapidly growing. But most surprising of all, when the velocities of the two sources were calculated, each appeared to be moving away from their common center at about four times the velocity of light!

Reports in 1976 by two different groups of radio astronomers announced this unexpected result. Since then, two other quasars (3C 273 and 3C 279) and one radio galaxy (3C 120) have been observed to exhibit the same phenomenon. In all cases, the radio sources are separating rather than moving together. This, then, is evidence for objects which appear to be travelling at velocities

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which exceed the speed of light. They have been given the name "superluminal" objects to indicate this.

One possible explanation of the superluminal objects is that perhaps we have the distance scale for quasars wrong, and that they are really much closer than we think, perhaps even within our own galaxy. This would clear up the mystery of their enormous light output, making it much smaller. Further, the distance between the hot spots would be smaller and so would their speed of separation. There are, however, problems with that explanation. The distance scale for quasars is based on their large Doppler shift, which indicates that the quasars are moving away from us at a very high velocity. This large recession velocity is assumed to be "cosmological," or arising from the effect of the overall expansion of the universe on distant objects. The quasar distance scale continues to be a hotly debated topic among astronomers, as it has been ever since their discovery. However, an impressive structure of evidence and logic supports the large distance scale which was used in the "superluminal" analysis.

Another possibility is that the speed limit violation which is observed is not a "moving violation." Astrophysicists supporting this view argue that we are observing a so-called searchlight effect. Their description is that the quasar is somehow generating two beams of particles or radiation which are striking nearby hydrogen clouds to make the observed radio waves. The quasar is rotating so that these beams are sweeping across the gas clouds. This is like a searchlight on the ground sweeping across clouds in the sky to give the appearance of a moving object (a bright spot) in the clouds. If the beams from the quasar sweep fast enough, heat the hydrogen cloud hot enough, and the hydrogen is far enough away from the quasar, this could produce radio sources which have a speed greater than c. In that situation, the apparent speed of the radio hot-spot would be greater than c, but no material object or information transfer would be moving at this speed. This explanation, however, does not explain why in all cases the hot-spots move *apart*.

Yet another explanation which has been put forward involves the phenomena of Doppler shift and relativistic time-dilation. In this picture the quasar has ejected two or more hot "blobs" which are moving toward us at slightly different angles and at very large sublight velocities. Because we are observing two rapidly moving systems which are at somewhat different distances, signals arriving at our eyes simultaneously may have left the objects at rather different times. Careful analysis has shown that this can lead to the relativistic illusion of two objects moving apart with superluminal speeds. But so far no explanation which has been offered seems to be able to explain all of the known facts. And so these superluminal objects have added to the already deep mystery surrounding quasars. They have also fired a "superluminal" missile at the crystalline cathedral of Special Relativity. Nevertheless, the latter does not seem to be in any immediate danger of destruction.

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IV. Conclusion

What do these three phenomena have in common? Perhaps nothing, except that they were unanticipated and cannot be readily explained by the 1982 version of theoretical physics. They have persisted over a period of several years despite the expectations of many physicists that they were "flukes" which would soon be proved wrong. In the next few years or so we can expect that these phenomena (assuming that they continue to hold up) will have been understood and absorbed into the body of our present understanding of the universe.

We can also be quite confident that there will by then be a whole new set of unexplained phenomena appearing from unexpected directions which will *not* fit our theories, our prejudices, and our preconceived notions of The Way Things Work. That is The Way Science Works! And that is what makes it fun! ■

BIBLIOGRAPHY

Quarks (Original Hypothesis):

M. Gell-Mann, *Physical Review*, Vol. 125, p. 1067, (1964).

Quark Confinement (see for example):

"The Bag Model of Quark Confinement," Kenneth A. Johnson, *Scientific American*, Vol. 241, No. 1, pp. 112-121, (July 1979).

Quantum Chromodynamics (see for example):

"Quantum Chromodynamics", D.B. Lichtenberg, *Contemporory Physics*, Vol. 22, No. 3, pp. 311-334, (May /June 1981).

The Fairbank Fractional-Charge Experiment:

"Observations of Fractional Charge of (1/3)e on Matter," George S. LaRue, James D. Phillips, and William M. Fairbank, *Physical Review Letters*, Vol. 46, Number 15, pp. 967-969, (1981).

The Observation of Accident-Prone Nuclear Fragments:

"Evidence for Anomalous Nuclei among Relativistic Projectile Fragments from Heavy-Ion Collisions at 2 GeV-Nucleon," E. M. Friedlander, R.W. Gimpel, H.H. Heckman, Y.J. Karant, B. Judek, and E. Ganssauge, *Physical Review Letters*, Vol. 45, Number 13, pp. 1084-1087, (1980).

Tachyons (Conference Proceedings and Review):

Tachyons, Monopoles, and Related Topics, Erasmo Recami, Editor, North-Holland Publishing Co., New York (1978).

Superluminal Objects (First Observations):

"Rapid Increase in the Size of 3C 345," M. H. Cohen, *et al., Astrophysical Journal Letters*, Vol. 206, pp. L1-L3 (15 May 1976). "Apparent 'Superrelativistic' Expansion of the Extragalactic Radio Source 3C 345," J.J. Wittles, *et al., Astrophysical Journal Letters*, Vol. 206, pp. L75-L78 (1 June 1976).

Superluminal Objects (Review of Observations): "Radio Sources with Superluminal Velocities," M. H. Cohen, *et al., Nature*, Vol. 268, pp. 405-413, (August 4, 1977).

Superluminal Objects (Theoretical Models): "Super-luminal Expansion in Extragalactic Radio Sources," R.D. Blanford, C.F. McKee, and M.J. Rees, *Nature*, Vol. 267, pp. 211-216, (May 19, 1977).

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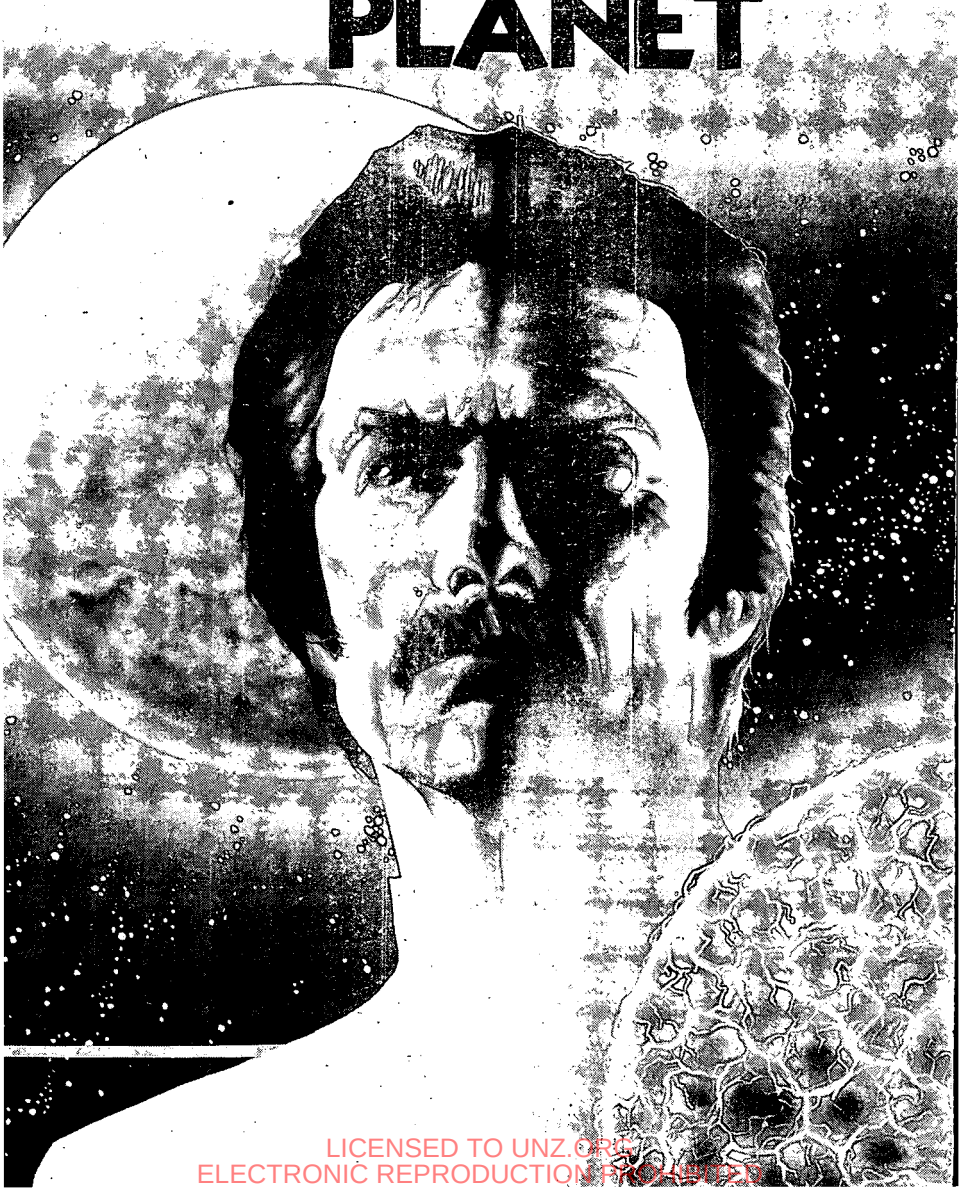
MURPHY'S PLANET



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The unofficial word reached Jon Lane first, via his sociometrician.

"Interested in getting out from behind that desk for a while?"

Lane, Draco Coordinator for the Advance Exploration Service—AES — placed his work station on interrupt status and looked up. "To do what?"

"Prospecting wants us to take a second look at a planet we released to them about eight years ago. They finally got around to evaluating it and ran into some things they couldn't handle. I hear you're going to be tabbed for the follow-up mission."

Lane did not try to hide his unhappiness. "Are they demoting me back to field status?"

"Not the way I heard it. They think this is serious enough to be handled by someone at our level."

Lane looked unconvinced. "What planet?"

"Kaillex-5."

"I wasn't involved with the survey on that one," Lane said, puzzled. "That would have been, oh, let's see—*Mantis*, I think."

"That's right."

"In fact, I missed it on both ends. That was licensed before I came here. I don't get it. Why me?"

"Because your sociometrician says you'd be amenable to a change from your routine."

"Efficiency's down, eh?"

"A bit."

Lane propped his chin on his hands. "What else did my sociometrician have to say?"

"That your reality orientation is stronger than most. That your uncertainty tolerance is greater than most. And that you're high-adaptive."

"Why does that matter?"

The sociometrician grinned. "Because the prospecting team came back with their spring sprung."

"That's some of your sensitive psychology jargon, right? Any details?"

"No—but there's a freighter coming in tomorrow that stopped at Advance Base Nine, where the team is quarantined and under observation. Maybe they'll have heard something."

The crew of *Homebound* had not only heard the story, but could talk of nothing else. Within two hours of its arrival, the entire complement of Draco Station —save those sleeping or in conference or both—knew the crucial details. Lane, along with five others, got them from one of *Homebound*'s mechtechs in exchange for a meal and a steady stream of drinks in the transients' lounge.

"It was a complete fiasco," the mechtech told them. "They skipped out early, called for an emergency pickup. Waited too long at that, from what we heard. The shuttle commander wants to quit the Service, soon as they'll let him. The chemtech won't sleep without sedation, and they have to watch the biotech to make sure he doesn't sedate himself permanently. The assay chemist thinks she's been called to found a church, because of the miracles she saw."

"Miracles?" asked Lane.

"That's what she called them," said the mechtech, in no hurry to use up his barter. "The brass called 'em 'anomalies.' Nice word, that. Nice way to say

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we don't know what the hell is going on." The mechtech smiled.

"It wouldn't take much to confound a bunch of prospectors," sniffed one listener.

"I think even you whitecoats would have been stumped," the mechtech drawled.

"By what?" the skeptic said challengingly.

"By one element changing into another in a sealed assay sample."

"Sounds like a prankster to me."

"Could a prankster make a beaker of glycol boil at room temperature by wrapping hard vacuum around it? Or turn the titanium-tantalum alloy in skiff leg-struts into a first cousin to glass?" He looked expectantly at the skeptic.

"Well—you said the team was crazy," the scientist said, looking around for support.

"Maybe that's what made 'em that way."

Lane said nothing. He understood now why he would be chosen. It was as his sociometrician had said. During Lane's eight years of field work, four different survey commanders had discovered the special clarity of vision he brought to his observations. His gift was his mental discipline, the ability to set aside all preconceptions, to accept a new world on its own terms. As a consequence, he saw the obvious more quickly and the subtle more readily. To him it was so natural as to be unremarkable, and for a time he wondered why others did not share his depth of perception. But after being productive twice as long as the average in a profession where learning from experience reduced one's usefulness and sometimes led to a fatal surprise, he was forced to accept his own talent.

While listening to the mechtech, he was of a mind to volunteer, but it was not necessary. The next day, Operations called Lane in and gave him the official word, and the whirlwind began.

The whirlwind ended with Lane and his team orbiting Kaillex-5 in the survey ship *Vanadis* and Lane wondering how it had all been accomplished in just ten weeks.

Part of it was attributable to the high priority Command had placed on ending the pervasive and disruptive rumors, which were outracing even consciously expedited official reports. Lane was told not to trouble himself with trivialities like mission budgets; Command would approve all necessary expenses. Personnel allowed him to choose from both permanent staff and the three survey teams in residence at Draco. Once selected, the special scientific team hammered out an experimental protocol in three days, and Supply filled out their materiel request in five.

The coup was pulled off by Transport. With no proper shuttle carriers available—Prospecting kept those they had busy and always wanted more — Transport broke a lease with a private research group and thereby came up with an older *Apus*-class survey ship, with crew intact. Not only would its hold handle a shuttle and the other large equipment, but since it dated from the days when each ship handled its own analysis, its labs were superior to those on newer survey craft.

The only hitch had come when Lane requested that a member of the team

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which had fled Kaillex-5 be assigned to his command. The weak excuses that accompanied the refusal—that quarantine could not be broken, that mixing the services would create discipline problems—underlined for Lane just how embarrassed Command brass were. But Lane persisted, and eventually was given permission for a side trip to Advance Base Nine to pick up Wayne Blanchard.

Lane met briefly with Blanchard when the phys tech came on board, and garnered no clear impression. Blanchard had been the oldest member of the prospecting team, and had compensated for his receding hairline by growing a full beard. The effect was a curious one, as if gravity had somehow dragged the hair from the top of his head around to the bottom. His nickname, Bobo, suggested an entirely different personality than the one he displayed. Blanchard was quiet, even subdued. He was neither unwilling nor eager to return to Kaillex-5, which he called Murphy's Planet: "A place," Blanchard told Lane, "where even the things that can't go wrong, do."

Lane got but one real glimpse into Blanchard. That came after the *Vanadis*' sociometrician reported that Blanchard was spending most of his free time alone, and most of that time using his library terminal. Lane found him poring over a physics file.

"Answers coming hard?" Lane asked in his best I-commiserate tone.

"You don't know the half of it," Blanchard said darkly, without looking up from the display. "We left the really crazy stuff out of the report."

He hesitated, sighed. "I think the one that finally got to me was the day before we left . . . I was taking a break, walking outside the shuttle. Suddenly everything had a greenish cast, like a badly tuned video tube. It was Kaillex. It had changed color. I saw it change the second time—to blue. Then a brown that made everything seem dead. Then a scarlet that made Murphy's Planet seem like the hell my grandmother believed in." He shook his head slowly. "There's got to be an answer. But I just don't know enough to find it."

Arrival at Kaillex-5 only transformed the scientific team from passengers to impatient passengers; *Vanadis* had her own tasks to perform. Taking up a low mapping orbit, the survey ship trained a dozen remote-sensing instruments planetward and duplicated the scans performed nearly nine years earlier by the AES ship *Pe*. Lane spent some time at an observation glass during this period; the thin, nearly cloudless atmosphere permitted an unobstructed view of the planet's mottled yellow-brown surface. A single oval sea stared back at him like some sort of cosmic evil eye.

Presently *Vanadis* withdrew to a higher, geosynchronous orbit, into which it placed three survey and data-relay satellites—called SurSats—equidistant around the globe. Only then did the *Vanadis*' captain notify Lane that he was ready to begin landing operations, and Lane came forward to watch the special security preparations being carried out.

First to emerge from the survey ship's congested cargo hold was the flameship, an unmanned probe originally developed as a weapon. It swept down in a preprogrammed path to hover above the

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prospectors' abandoned base. From there it scoured the surface, reducing the simple plantoids growing in a 100-meter circle to a thin layer of grey-black ash. A second probe moved in, bathing the soil in killing radiation, rendering it sterile to a depth of fifty cents.

Next, the survey ship's tiny two-place gig moved in, spraying the clearing with a fibroceramic sealant, turning the ground into an inpenetrable pebbly tile. The gig circled for ten minutes while the sealant set, then landed. Working quickly, they unloaded and erected around the perimeter of the camp eight antennae shaped like metallic brittlestars. In the midst of this operation, Lane was called away to board the prospecting shuttle *Banife*, where the rest of his team—four scientists, a data analyst, a pilot-mechtech, and Blanchard—were waiting. It was their turn at last.

Banife came in quickly, her gravwarp generators permitting stomach-wrenching non-ballistic maneuvers. As the shuttle neared the surface, the *Vanadis* gig vacated the landing site, circled it once, and headed skyward with radioed best wishes. Unspoken but evident was their relief that their part was done.

A different attitude prevailed on *Banife*. From the moment the shuttle's sixty-meter-long wingless bulk settled in the center of the circle, the team members attended to their tasks with an eagerness and efficiency that delighted Lane. The final fensor antenna was deployed, telescoping out of the ship's hull on a slender stalk, completing the energy cocoon which would isolate them from the planet's lifeforms. Others moved to unfold the four expandable sleep rooms —biopods—built into the sides of the shuttle's hull, and to convert the shuttle's systems from flight to ground status. Only Lane and Blanchard were left sitting in the forward compartment.

"Was all this really necessary?" Blanchard asked unhappily, gesturing toward the transformed landscape outside.

"Why, don't you approve?"

"It seems excessive—like we're at war."

"We have to cut down on the variables somehow. Would you rather wear an E-suit all the time?"

The howl of pain that arose that moment from the back of the shuttle forfended an answer.

Lane and Blanchard were among the last to converge on Lab B. They found Randy, the chemist, writhing in a corner on the floor, his hands and forearms an angry red and beginning to blister. Francie Aungst knelt beside him, cooing soothing words and rummaging in her meditech kit for the burn treatment pack. The aluminum surface of one of the lab tables was seared and distorted; it and the floor around it were dusted with yellow powder from the lab's fire-fighting system.

"What happened?" Lane demanded.

"Damned if I can tell you," said McLeod, the pilot. "I heard him scream and came running. The whole top of the table, flames were half a meter high."

"How is he?" Lane asked Aungst.

"Second degree. A little shocky. I'd like to get him to the biopod."

"Randy? What were you working with?"

The chemist grimaced before answering, as Aungst was swathing his

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right arm in a soft-fill burn bandage. "Nothing," he said weakly. "I was just sitting down to review the protocols."

"No cleaning solutions? No reagents?"

Randy shook his head.

"Okay, Francie, get him to bed," said Lane, turning to the lab table. He blew the yellow powder off a portion of the surface, revealing a white coating over the still-warm metal. "I want to know what this is."

"I can do that," offered Ban'du, the physicist.

"If Randy's out of it for a while, can you handle his experiments on top of your own?"

"Possibly. If I can get some help on the busywork, yes."

"You'll get it," Lane promised. "All right, everyone, let's get to it. Coordinate the start of your runs with the folks on *Vanadis*. Lynn, remember that the gig will be coming down tomorrow for the split of the soil, air, and water samples. You and Garth had better get going."

Blanchard hung back as the others left. "It's starting," he said when they were gone.

"Maybe," said Lane.

Blanchard pointed at the table.

"All right, it's started. You folks are off the hook. God does play at dice, after all," said Lane peevishly. "Happy?"

But Blanchard clearly was not; his face showed apprehension, and his voice was troubled. "I hope it doesn't keep up," he said, and went to find Ban'du.

Curiously, Lane found that the lab fire did not seem to have had any impact on the rest of the team. They shared an unspoken agreement that the chemist had done something so colossally foolish that he was using the planet's reputation to avoid being embarrassed. As a regrettable lab accident, the incident created no disequilibrium, and required no novel explanations. So unanimous and unwavering were the others that Lane began to question his own appraisal, wondering if he had not let his expectations color his perceptions. He wondered right up to the moment the call-to-stations alarm began to ululate its warning throughout the shuttle.

"Radiation alert," McLeod told Lane as he entered the forward compartment.

"Everybody inside?"

"Yes, sir. I make it microwave radiation, frequency about 10 to the 10th cycles."

"X-band?" Lane said, surprised.

"Yes—but not radar. There's no single source. It's coming from all around us. And the intensity is way too high. Even in here, I figure our exposure at five watts or more."

"Permissible dose is a hundredth of a watt," said Garth from behind them. The biologist's voice was calm but concerned. "We're probably experiencing some diathermy right now."

"I can't feel anything," McLeod protested.

"You won't, either," Lane said, leaning forward and peering at the data displays. "Can't you pin down a source, so we can send out the skiffs?"

"I'm sorry—there are some hot spots, but—"

"How many?"

"Nine. Eight radially, one vertical to us—"

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"The fensor array," Lane said suddenly.

McLeod twisted his head around to stare at Lane. "Can't be," he insisted. "There's no way that unit can function as a klystron."

"Shut it down."

"But Commander—"

"Dammit, we're being fried by our own fensor field! Shut it down!"

Reluctantly, McLeod complied. The keening of the alarm, to which they had become inured, suddenly ceased.

McLeod sat in his flight couch, biting his lower lip and shaking his head. "That's impossible."

"I think I'd be careful about using that word while we're here," Lane said gently.

"It's some sort of trick," McLeod said stubbornly. "I know that unit inside and out—"

"Trick, Mac? Carried out by whom? There's no native sentient life. No animaloids at all."

"Except gremlins," said Garth, amused.

Lane turned to the biologist. "Are we going to have any problems from this?"

"My guess would be no. I notice you've started to sweat a bit—so have I. We're dissipating that extra internal heat. Eyes are most sensitive—we'll have to watch for cataracts. But the only damage is likely to be a few broken protein molecules here and there in the body."

"If we're lucky."

"We *were* lucky," Garth said soberly. "We could have been *sapiens* steak." With a nod that said "thanks," he headed back down the corridor to his lab.

"I'll strip down the array and find out what happened," McLeod said quietly.

"When you're finished, pack it away. If we can't trust it, we're not going to use it. I don't want to have to use the alarm as a backstop. Next time, it might not work either."

Forty minutes later, skiff 41, with Garth and planetary scientist Katherine Grey aboard, rose from the camp, banked sharply, and jetted toward the east on a sample-collecting foray. Lane watched it go with some apprehension, though he and Blanchard still seemed to be holding the minority view. The near-disaster with the fensor array quickly became just a story worth telling when they returned to Advance Nine, even for McLeod. Lane overheard him kiddingly explain that he had arranged the whole thing because he couldn't find a heating pad for his sore back. But before long, the kidding stopped, and Lane was back in the forward compartment, answering a different kind of alarm: skiff 41 had crashed.

"We were only about fifty meters above the trees," Katherine reported, "so it wasn't as bad as it might have been. But Garth's right forearm is broken, and I don't think old 41 is ever going to fly out of here."

"Any idea what happened?" Lane asked, aware that the rest of the team had crowded in behind him. "Gravwarp failure?"

"That's what's confounding me. I don't know if you've ever crashed anything," Katherine radioed back. "It happens so slowly, like you'd have time to write a will on the way in. Or to look

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at the status board. The gravwarp had green lights all the way across."

"All right—that's not important," Lane said, conscious of his audience. "If you're in no immediate danger, just stay put. I'll send Mac out to get you in the other skiff."

"That might not be the best idea," the geoscientist responded. "I put us about nine kilometers away. We can probably reach you in ninety minutes or less, even stopping to pick up some samples along the way. If we overinflate the lining of the E-suit, it'll make a dandy splint for Garth's arm. His suggestion, by the way. This way you don't have to risk the other skiff or anyone else's skin. We'll bring the flight recorder memory with us for analysis."

The presence of the other team members inhibited Lane from arguing and thereby infecting them with his own fears. "You have this all worked out, don't you?"

"I think so," Katherine said cheerfully.

"All right. Call in every half hour, and keep the stops to a minimum. And if Garth starts to flag, call for a ride."

"Roger. See you in a bit."

"There won't be anything in the flight data," Blanchard said quietly. "There never was anything wrong, afterwards."

Lane turned to face him. "What do you mean?"

"My guess is that the planet just reached and yanked the skiff out of the air."

"A masscon, you mean. A gravitational anomaly."

"I'm not offering explanations—just descriptions."

"You're talking nonsense, is what you're doing."

"Of course," said Blanchard. "Murphy's Planet is the product of an irrational mind. The only question is, whose?"

The crash of the skiff was a turning point. From then on, the team was figuratively looking over its shoulder, wondering what was going to happen next. While their experiments produced precisely predictable results, the world outside the lab was going mad.

Concern heightened when, during a late third check-in, Katherine advised them, "We've got to get out of our E-suits, so this'll be the last you hear from us until we reach you." They acknowledged no questions and offered no explanations—only an ominous silence.

It was nearly dark, and Lane was on the verge of sending Mac out in skiff 17, when Garth and Katherine finally emerged from the tangled scrub on the periphery of the camp. Before the others could descend on them to satisfy their curiosity and vent their emotions, Lane dispatched Garth to Francie's care and quick-stepped Katherine to his biopod.

There she eased herself down on the edge of the cot with obvious relief. Lane guessed that the urge to stretch out full-length was strong.

"You all right?" he asked, noting the tears and stains on her clothing.

"More or less. Now."

"What happened to the E-suits?"

"The rebreathers failed—we had to leave them, or we'd have keeled over along the way for sure."

"Both suits?"

"Within minutes of each other. I

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know, you think we should have asked for a pickup. But there was no way I was going to be responsible for bringing someone else into the middle of that nightmare," she said with intensity.

"Why? What was happening?"

Katherine took a deep breath. "Some *thing*, some—I don't know what—" She swallowed and started again. "Things were being thrown at us. It started with dust devils that moved right along with us, and then it escalated." She twisted and pulled up the back of her blouse. "I caught a rock, right here." She pointed, but it was unnecessary. Lane could clearly see a fist-sized, puffy, purplish bruise.

"We walked back-to-back, to protect each other," she continued. "That's why we took so long."

"Could you see where they were coming from?"

"Sometimes. There wasn't anybody on the other end. They'd just rise up off the ground and hurl themselves at our heads. And—there was something else. Garth didn't see it, only me." She stopped, and averted her eyes. "I'm not even sure *I* saw it. A silver sphere, maybe a meter across—not solid, just glowing spiderwebs wrapped around darkness." She looked up. "I know how that sounds," she added. "Commander, if I can say this without making it into a suggestion, I can understand why Bobo's team pulled out."

"You can say that to me, but let it stop there. Now—you'd better go let Francie look you over."

"All right," she said, pulling herself to her feet. As she moved past him he reached out and took her hand.

"Kath—I'm glad you two are back okay," he said gently.

"I'm glad we're back, too," she told him, biting back tears of relief or frustration or both. "I wouldn't want to be out there in the dark."

As team commander, Lane would ordinarily have merited a biopod to himself. But Blanchard had swelled the team by one, making it necessary for Lane to share. As a consequence, later that night he found himself reliving what when he was younger had been a familiar experience: lying in the darkness, listening to the breathing and restless movements of another person, and knowing that neither of them was near sleep. Finally Blanchard broke the silence.

"The fire residue was aluminum oxide."

"I'm not surprised," said Lane, staring in the direction of the ceiling. "I guess your stock has gone up, now that we've run into the same things your people did."

"I'm not a pariah any more, if that's what you mean. But Jon, you haven't seen what we saw. This is different."

"Different how?"

"More personal. We were never in danger. The things that happened the first time I was here were more like parlor tricks—amusing at first, like a cartoon come to life, disturbing later on, but never, ever, life-threatening."

"I wish we'd been as lucky," Lane said moodily. "Did you hear I'm sending Randy up to *Vanadis* when the gig comes in the morning? He can't work, so they're trading me their chem tech."

"You're not listening," Blanchard

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complained. "I'm telling you, there's been a basic change in the character of the incidents. They weren't vicious. *And* they didn't start this soon after landing."

"Which means what?"

"I don't know what it means. But I thought you should know. That's why you brought me along, isn't it?

"Yes, of course," Lane said tiredly. "But I've got enough puzzles already, if you don't mind. You come up with any answers, and I'll be a lot more receptive."

The gig arrived just after nine. The pilot, a young lieutenant, made an effort to meet with everyone, handing out words of encouragement like psychological Band-Aids. Lane admired the effort but was too cynical to benefit from it. The night's sleep had done little to banish his outrage over the mendacity of Murphy's Planet.

The *Vanadis*' chemtech sought out Lane. "I was asked to alert you to an anomaly we picked up upstairs," he said, handing over a memory module.

"What's that?"

"According to the overnight analysis of SurSat data, it seems that Murphy's Planet casts a neutrino shadow."

"You're outside my speciality. Explain."

"Well—the local star is the source of the neutrinos, of course. As part of the environmental studies, we measured the particle flux on both the lightside and darkside of the planet. The readings should have been virtually identical. A body this small is for all practical purposes neutrino transparent. But the readings were sixty percent lower on the darkside. All three SurSats confirm it. The only thing we can think is, something down here is an extraordinary neutrino absorber."

"The ghost particle—" Lane said in a faraway voice.

"Yes, sir. Can I get to work now, sir? From what I hear, the less time spent here the better."

"Hmm? Oh, go ahead." Lane stood there a moment longer, watching his injured chemist boarding the gig, his mind shuffling the events of the past day into a new pattern. The pattern, though incomplete, formed true and held promise, and Lane headed for the shuttle.

His first stop was the library terminal in his compartment, through which he skimmed both the module the chemtech had delivered and the file on neutrinos: almost massless, high-energy particles produced in certain subatomic reactions. They were amazingly contemptuous of matter—a typical neutrino might travel through a light-year of lead before being absorbed, hence its nickname of "ghost particle." Postulated in the 20th century by Earth's Wolfgang Pauli to explain neutron-proton transformations, the neutrino proved so elusive that a quarter-century passed before it was detected experimentally. Lane learned that the best natural neutrino absorbers were gallium-71 and indium-115, but that even with those, enormous quantities were required. Armed with that knowledge, he sought out Katherine in the assay lab.

"Rare, both of them," was her answer. "Not more than a trace in the crustal material, though down deep there could be more. I feel safe saying the two together don't amount to a hun-

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dredth of a percent of the planet's mass. Why?"

He displayed for her the data on the missing neutrinos. "How does the absorption of that many neutrinos fit into the planet's energy budget?"

"It helps explain a few things. The planet is a little warmer than I'd expect, considering its distance from the star and the level of internal radioactivity. In fact, I can't quite figure out why it still has liquid water, unless the warmup was recent. In any case, it's on its way to becoming a desert."

"Good enough. I'll leave that module with you, since you'll probably have to do some work with it."

Lane's next stop was the tiny data analysis cubicle; with Francie seated at the library computer, there was not enough room for Lane to stand inside. "Francie, has anyone searched the literature for incidents like we've been experiencing?"

"I have. I think Bobo did, too. Didn't come up with anything, though."

"Maybe you were checking the wrong literature. Maybe these things wouldn't have been reported in the science banks. Try the sociology banks, instead."

"Do you want me to drop what I'm working on now for Ban'du to get on that?"

"I think I do. I'll tell Ban'du his analysis'll be delayed."

Ban'du and Blanchard were in Lab A, calibrating the Mössbauer spectrometer for an experiment.

"All results are still nominal," Ban'du said stiffly.

"I wasn't looking for a report—just the answer to a question," said Lane. "These, uh, events we've experienced. Could you duplicate them all, given enough energy and the right instrumentality?"

Ban'du scowled. "I don't have enough data on most of the events. But I doubt whether we could make *any* of them happen, under these circumstances or any other."

"Jon, I couldn't disagree more," Blanchard said, stepping forward.

Ban'du glowered at him.

"I know this is presumptuous of me, since I'm just a tech. But Jon, you know I have been working hard on this. The answer to your question is *yes*. It's all possible," Blanchard said. "In some cases the instrumentality doesn't exist except theoretically, partly because if we ever wanted to do it we'd take a more direct approach. I mean, why throw a rock with a force field when you can pick it up and use your muscles? But as far as I can tell, these events aren't exceptions. They may be *de*ceptions."

"I can't go along with that with the data I have now," Ban'du said icily.

"Then I guess Bobo is the one I want to talk to," Lane said pointedly. "Come on." He jerked his head in the direction of the door.

"What's up?" Blanchard asked, as he followed Lane into the corridor.

Lane told him about the missing neutrinos. "We're talking about an enormous amount of energy. It's ending up in the planet's energy budget as random heat—Katherine can confirm that much. How it's being captured is a big question mark. But I have a good idea what it's being used for, at least part of it—to cause these oddities to take place."

"I can almost see that—except that

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in some cases it would require the ability to manipulate the energy almost quantum by quantum."

"But that's not an energy problem. That's a problem for the instrumentality—the agent. That's what we have to go after."

"What do you want me to do?"

"The SurSat data shows no correlation between the particle flux and the length of the track through the planet. That suggests a surface phenomenon. Call it an N-trap. The data also shows wide variations from point to point. That suggests that there are particular focal points, clusters of N-traps where this energy is captured and stored. What's more, the variations change from orbit to orbit. That suggests the N-traps are mobile."

"You want a way to detect these—N-traps," Blanchard said slowly.

"Yes."

"Well—whatever these N-traps are, they can't be a hundred percent efficient. There has to be some loss, some leakage. But I don't see how we could pick it out against the background radiation." He stroked his beard absently as he thought out loud. "I don't know. If the leakage is there, there ought to be a way. Can I have Mac?"

"Yes."

"Okay." He took a step aft, then stopped. "These N-traps—you're not thinking of them in purely mechanistic terms, are you."

"No comment."

"All right, why me, then? Why not get everyone working on it?"

"Because there's nothing they could do but think about it, and I'm counting on the discipline of routine to keep them functioning as long as possible."

"Nothing's happening."

"You were here both times and you still don't see it. These incidents always took place around or after local noon. There'll be more today, count on it," Lane said grimly.

"How do you know?"

"Because one of the biggest clusters of N-traps follows the sun—and the leading edge of it will be here in about an hour."

True to Lane's anxious prophecy, at midday the fabric of their world again picked up an irrational thread, and this time cockiness was not an adequate defense.

Ban'du, showered with glass when the normally inert argon in an overhead light bar exploded, became more irascible than usual. He declaimed eloquently to an empty lab on the impossibility of working productively when eternally interrupted by lesser minds.

Garth, sealed in the head when its door and frame fused into a single mass of metal, descended into solipsism, declaring that all outside the walls existed only through the grace of his will. Proclaiming his dissatisfaction with the reigning gestalt, he withdrew into himself to refine a new one.

Katherine, confronted by a momentary paralysis that prevented her even from breathing, fled her lab and cornered Lane, demanding that he take them back to *Vanadis*. When she regained enough control to be embarrassed, Lane gave her the job of debating

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the still-imprisoned Garth back to reality.

Lane found Francie at the flight compartment data console, suffering only from frustration. The library computer was stuck somewhere in its self-correcting debug program, and Francie could not get it to respond constructively.

"Did you find out anything before it went down?" he asked her. "Any incidents like what we've seen?"

"Oh, yes—thousands of citations, once I figured out that every culture comes up with its own explanations—won't tolerate mysteries. I found a flock under religious manifestations, UFOs, psychic phenomena. But the data are really garbage. Anecdotal popular media stuff. Thrills for bubbleheads, and over ninety percent dope out as frauds. But there are a few real ones, almost all from Earth, almost all from the second half of the second millennium. No exact matches, but the flavor is the same."

"Stay with it," Lane instructed, and headed aft. As he passed Lab B, he heard odd noises and stopped. He discovered the *Vanadis*' chemtech sprawled on the floor in a corner, laughing and crying at once. On the counter where the tech had been working, the liquid in three open-top beakers was quietly climbing up the side of the glass and flowing over the top and onto the counter.

Feeling helpless, Lane continued down the corridor. But the wretch's incoherent noises stayed with him, an admission of and a protest against the absurdity of Murphy's Planet.

* * *

"Running out of time, boys," said Lane, standing in the double-wide doorway of the equipment bay. "I don't want to leave without an answer, but if we don't leave soon, we may not be able to leave at all. Do you have anything?"

"A headache," McLeod muttered.

"The unit's ready for bench-testing," Blanchard said quickly.

"Let's pass on that if we can."

"We can't," McLeod said shortly. "Give me ten minutes—fifteen, tops. Tell me where you want it when I'm done and then clear out. You too, Bobo."

"Outside," Lane said, letting the mechtech's presumption pass. He led Blanchard toward the aft hatch, pausing en route to instruct Katherine by intercom to begin preparing the shuttle for departure. Her gleeful cry was audible without benefit of electronics.

"Do you want to explain now?" asked Blanchard, following Lane down the stairs to the compound.

"Control of the environment," Lane said, scanning the brush outside of camp. "A basic goal of living things. We have it through our machines. But that's not the only possible instrumentality." Lane shook his head. "I just know they're out there, watching."

"They?"

"It's the perfect defense against invasion by a gadget-building species," Lane said, thinking out loud. "Far easier than out-gadgeting them. We're so dependent on our machines—and so helpless without them." He turned to Blanchard. "This thing you built—how does it work? What will I see?"

"It's set up to compare two inputs

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—emission and reflection. Hopefully, we've convinced it to treat the background as noise—anything it can 'see' gets subtracted from the display. Same principle the SurSat autocorrelators use."

McLeod appeared at the top of the stairs, carrying the bulky, awkwardly shaped unit.

"There's no recording capacity, though," Blanchard warned. "And the output is visual. We didn't have time for fancy refinements."

"They won't be needed, I hope."

McLeod joined them. "Seems okay."

"Point it at the edge of camp."

"There's nothing out there," McLeod protested.

"Do it."

The display remained black. "That's the lowest frequency it can detect. I'll run it up the spectrum now."

Behind them metal groaned and motors hummed as the biopods moved slowly to the closed position.

"There!" Blanchard said suddenly.

An irregular yellow web, like a cracked eggshell lit from the inside, appeared on the display. A moment later two blue webs joined it, drifting slowly in from the right, spinning lazily in opposite directions as they advanced. The elements of each web brightened and faded in no pattern, as if seething energy was only barely being contained.

"They *are* good at that," Blanchard said in awe. "Less than a millionth of a watt each. They'd be completely lost against the normal background radiation."

"But what are they?" McLeod demanded, finding his voice at last.

"N-traps," said Blanchard. "Neutrino gobblers."

"More than that," said Lane. "Gremlins. Poltergeists. Faeries." He took the unit from McLeod and swept it to the left, then overhead. The beings were all around them, in a dozen colors and twice that many shapes, in ceaseless graceful motion. "Go see that we're ready to leave," Lane told McLeod. The pilot did not argue.

"More than that, even," Lane said softly, almost to himself. "Homebrothers."

"Pardon?" asked Blanchard, standing beside him.

"When the first neutrino astronomers began to measure the flux from Earth's Sun, they were detecting only about a third of the neutrinos predicted by the physicists," Lane told him. "It was a real problem in particle physics. But they were using giant tanks of chemicals deep underground as detectors then. Compact detectors that could be used off-Earth came much later—and by then the numbers had come in line. At about the same time that the first AVLO ship was built."

"These things were on Earth—and then left?"

"And then we brought them here — nine years ago, on *Pe*." He smiled faintly. "How much room would they take up, after all?"

"But why would they leave?"

Lane laughed. "God, who knows? Maybe our fusion reactors were seducing the young away from the old ways—if they have young. Maybe our bioelectricity disturbs them, and we just crowded them out. Maybe we deeply offended their sense of morality." He grew serious. "I'm certain of one thing—they've known us for a long time, and they're

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not much interested in sharing a planet with us again. They scared you off. But we came back like we meant to stay—and they fought back, by trying to make their planet as unattractive to us as possible."

"Commander Lane! Ready to go," called McLeod from the forward hatch.

"They succeeded," Blanchard observed.

"Coming," Lane called in answer. He was transfixed by the unreality and beauty of the ghostlike images revealed on the display. *Pirouetting light-webs, what am I to you? Fifteen life-bearing planets I surveyed, and never anything like you. I always found a point of contact. Always the form of matter. Always the fathering force of evolution. But we share nothing save a mutual distrust.* "Answering one question always leads to others, doesn't it? I find myself wanting to stay a bit longer to work on them," Lane said. "How do they manage structure without matter? How do they sense us? Do they have a life cycle, or just life?"

As he spoke, a blue-green web on the display flared brightly and grew as if approaching. A white-light lance stabbed out toward them, and the screen went black. Then Lane cried out, and flung the device to the ground. He and Blanchard stared as the modules, the image tubes, the rack that held them, all began to deform, the hard straight edges turning to soft, flowing ones. In a few moments, all that remained was a silver-tinted amorphous puddle—and a pulsing silver obloid of energy hovering above it.

"On the other hand, we may have outstayed our welcome," said Lane, pushing Blanchard firmly toward the shuttle. His racing heart belied his flip tone, and he started his own cautious retreat. The obloid followed, herding him in the right direction.

When Lane reached the stairway, the obloid stopped advancing, faded to a glittering spherical web, and vanished. Lane hesitated. "There'll be no colonies built here," he called out to the empty clearing, not knowing if or how they would understand him. "If I have any say in it, you'll have this planet for your own." Then he turned and hurried into the shuttle.

The release of Garth the moment they lifted off made Lane wonder if there had not been a point of contact, after all. ■

● Life has a status in the physical universe. It is part of the order of nature. It has a high place in that order, since it probably represents the most complex state of organization that matter has achieved in our universe. We on this planet have an especially proud place as men, for in us as men matter has begun to contemplate itself.

George Wald

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ON GAMING

Dana Lombardy

H. G. Wells was the father of modern science fiction, a pacifist—and a wargamer.

It may seem paradoxical that a liberal thinker and anti-militarist like Wells would enjoy games of a military nature. But he found nothing contradictory in exercising his mind with games of military strategy and tactics while deploring real war.

Seventy years ago Wells wrote *Little Wars: A Game for Boys from Twelve Years of Age to One Hundred and Fifty and for That More Intelligent Sort of Girls Who Like Boys' Games* (available in paperback for $4.95 from Dacapo Press Inc., 233 Spring Street, New York, NY 10013). This book is credited with starting the hobby of wargaming. To honor Wells's contribution, the Game Manufacturers Association (GAMA)—through its Academy of Adventure Gaming Arts & Design—has created the H. G. Wells category of awards for outstanding achievements in the areas of role-playing games and miniatures.

H. G. Wells played his wargames using tin toy soldiers, metal miniatures popular with boys of his period and not unlike the plastic ones we grew up with. Gaming miniatures today, like SF books, are a lot more sophisticated and complex than when Wells wrote *Little Wars* in 1913.

They're still made of metal, but gaming miniatures today are cast of an alloy that includes only a small percentage of tin. In Wells's time, tin soldiers were typically two to three inches high; today the figures are much smaller. The most common sizes are ten, fifteen, and twenty-five millimeters—about as tall as your thumb is wide. (This means a real space advantage, because the games can now be played on a table rather than spread out on a floor. Further, because today's figures are smaller, you can use many times more of them to represent larger armies.)

There was not much variety among the types of miniature soldiers available in Wells's time. For the most part, the figures represented soldiers of the Napoleonic or the British Colonial periods. While these continue to be popular periods for gaming, today's wargamer may choose from many other historical eras: the Roman Civil Wars, the Crusades, the American Civil War, the American Revolution, World War II, and even hypothetical conflicts between NATO and the Warsaw Treaty Organization.

History is not the only subject of today's miniature battles. Fantasy armies are deployed with dragon riders, trolls, and elves clashing in struggles that bring to mind the titantic conflicts from Tolkien's trilogy *The Lord of the Rings*. And SF buffs can enjoy maneuvering scale starships, ranging from a scout chasing a lone pirate vessel to entire fleets battling for control of a solar system.

Yet only a minority of the figures cast today are used to represent historical or conventional armies. Most of the miniatures are used not in waging war, but in

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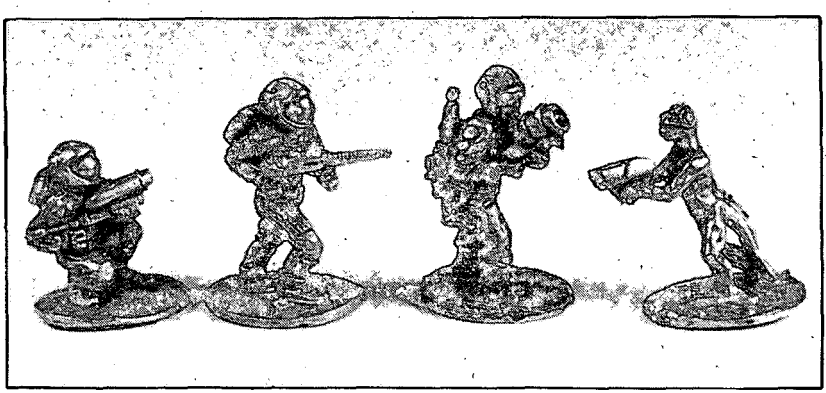
role-playing games. In role-playing, a player needs only one figure instead of dozens or hundreds as in a battle simulation.

In a role-playing game (rpg), each participant plays as a specific *character:* wizard, thief, barbarian, amazon, pirate, starship captain, mercenary, etc., complete with name and individual attributes which make the player feel that he or she is really that character.

It's this sense of individual involvement that brought about the demand for miniatures—thousands of miniatures—to represent specific characters in role-playing games. As a result, instead of just two or three styles of wizards to choose from, there are dozens, because each player wants his "wizard character" to be different. After all, the miniature figure should be as unique as the player's character.

A role-playing gamer can further individualize his figures by painting them. Painting is simple. Just cover the figure with a base coat of primer, then select whatever colors seem appropriate, or what is historically accurate for the uniform, if the figure represents a particular period. Most miniaturists prefer water-soluble paints; they mix easily, do not need thinning, are easy to apply, dry quickly, and give a beautiful finish.



SF miniature (25 mm high) by Ral Partha Enterprises.

If you don't feel skillful enough to paint one of these small figures, all you need do is apply a very thin black wash over unprimed metal. The result is a nice antique effect (most of the miniatures in the accompanying photos were done this way). If you don't want to pick up a brush at all, you can use paper miniatures. These are available already printed in full color.

One of the satisfying features about gaming miniatures is that, whether you're refighting a battle or representing your Imperial stormtrooper in an rpg, you're very much a part of a tradition that H. G. Wells helped to popularize. ■

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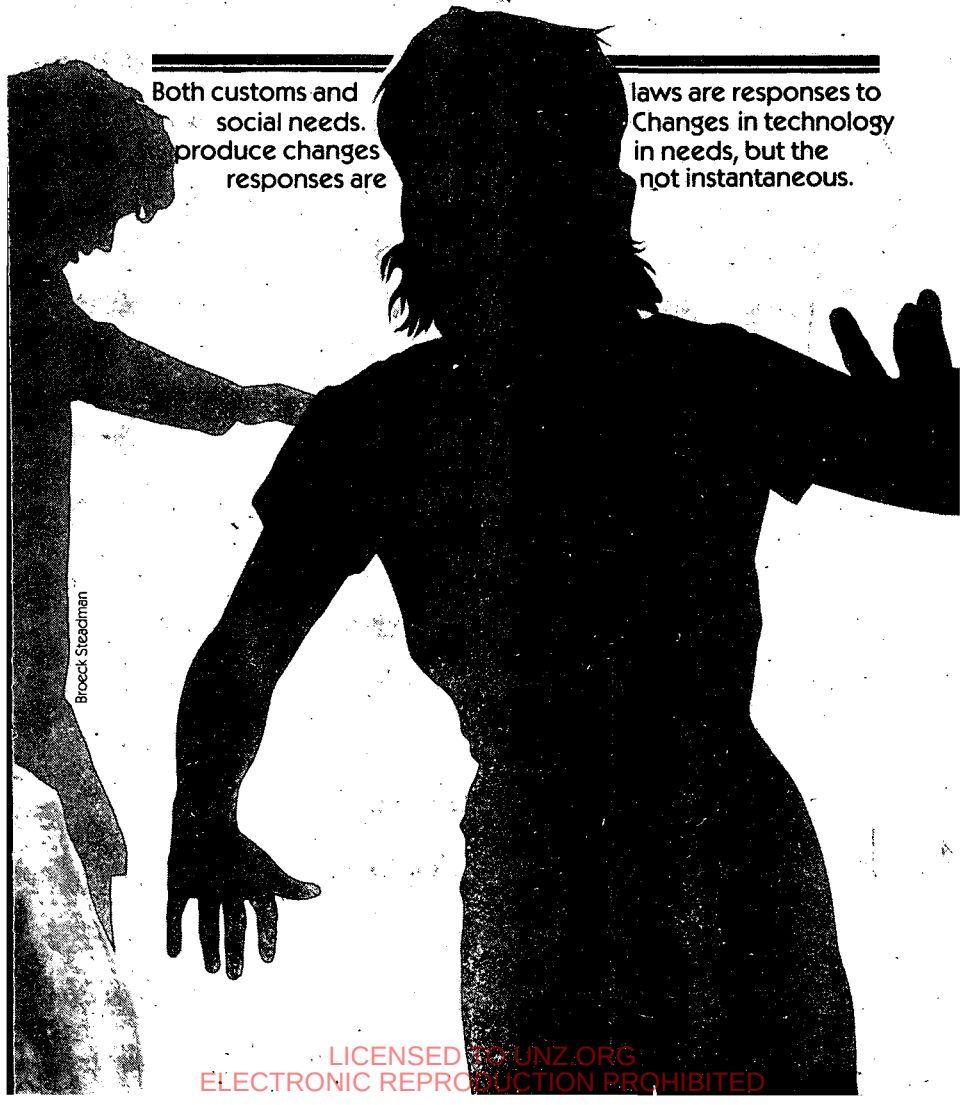
SERVANT OF THE PEOPLE

Frederik Pohl

Both customs and laws are responses to social needs. Changes in technology produce changes in needs, but the responses are not instantaneous.



Broeck Steadman

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For Congressman Fiorello Delano Fitzgerald O'Hare, the election campaign started traditionally on the Tuesday after Labor Day. That was traditional for the congressman, anyway, feisty little seventy-plus-year-old who liked his own traditions and didn't care much what anyone else's were; the summer was his own and his lady wife's, and when he started to press the flesh and hunt the votes was at the League of Women Voters televised debate and not a minute before. So at six o'clock on the evening of the eighth of September there was Carrie O'Hare one more time, straightening the fidgeting congressman's tie, dabbing a blob of the congressman's shaving cream off the lobe of the congressman's fuzzy pink ear and reassuring the congressman that he was wiser, juster and, above all, far more beloved by his constituents than that brash new interloper of an opponent, the mayor of Elk City, could ever hope to be. "Quit fussing," said the congressman, with his famous impudent elf's smile. "The voters don't mind if a candidate looks a little messy."

"Hold still a minute, hon."

"What for? It all has to come off again for the doctor, maybe."

"Or maybe he'll just take your pulse, so hold still. And listen. Please don't tell them about game-hunting in the Sahara tonight."

"No, Carrie——" twinkling grin—"we leave the speeches to me and everything else to you, right? They're going to want to know what their congressman did over the summer, aren't they?"

Carrie sighed and released him. It had been a successful safari—the congressman had photographed dozens of mules, and even one actual live camel—but what did it have to do with the congressman's qualifications for one more term in the United States House of Representatives? "Hold it a minute," she said as an afterthought, sent one of the household robots for a fresh pocket handkerchief, repinned the American flag button in his lapel, and let it go at that. She needed all the rest of the time available on the larger task of herself. Voters might forgive a congressman for looking rumpled, true enough, but a congressman's wife, never.

She sat before her mirror and reviewed all the things she had to do. There were plenty, not made easier by the little knot of worry in her stomach. Well, not worry. Normal nervousness, maybe, but not real *worry*. The Congressman was a winner and always had been. Fiorello Delano Fitzgerald O'Hare, servant of the people for half a century plus a year, eight months and a week, might have been custom-built for politics, as well designed as any robot, and with the further advantage (she thought guiltily that you shouldn't call it an "advantage") of being human. He had the name for it. He had the friendly and trustworthy look, with enough leprechaun mischief to make him interesting. He had the manner that caused each of thirty thousand voters to think himself personally known to the congressman, and above all he had the disposition. He actually enjoyed such things as eating rubber chicken at a dinner for the B'nai B'rith, square-dancing at a fireman's fair, joining the Policemen's Benevolent Association for a communion breakfast. He even liked getting up at

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5 A.M. to get to a factory gate to shake the hands of nine hundred workers on the early shift. All of these things were a lot less enjoyable for the congressman's wife, but what she unfailingly enjoyed was the congressman himself. For he was a sweet man.

Carrie Madeleine O'Hare was quite a sweet woman, too. You could tell that by the way she spoke to the maid, tidying up behind her. Carrie had had that same maid since her marriage, forty years before. The congressman had been thirty-five years old, Carrie herself twenty-two, and the maid a wedding present, fresh off the assembly line, an old-style robot with all its brains in some central computation facility—no personality, no feelings to hurt. But Carrie treated the robot just as she would a human being—or one of the new Josephson-junction machines, so close to human that they even had voting rights . . . for which they had to thank in very large part the congressman himself and damn well, Carrie thought, better remember it come November.

Carrie's preparations only went as far as makeup, hair and underwear—there was no point in putting on the dress until they were ready to go, and the congressman's doctor hadn't even arrived yet for his traditional last-minute medical check. So she pulled on a robe and descended the back stairs to the big screened porch for a breath of air. The house was ancient and three stories high. It stood on a little hill in the bend of the river, water on two sides. It would have been a fine house to raise children in—but there hadn't been any children—and it was a first-rate house for a congressman even without children. All through the years when small was status, the congressman had stuck to his sixteen rooms because they were so fine for parties, so fine for entertaining delegations of voters and putting up visiting political VIPs and all the other functions of political power. Carrie sat on the porch swing, and found herself shivering. It wasn't the temperature. That had to be at least seventy-five degrees, in the old Fahrenheit system Carrie still used inside her head. It was still summer. But the wind made her feel cold. And that was strange, when you came to think of it. When had the TV weathermen started talking about wind-chill factors even in July and September? Why was it always so windy these days? Was it just because of the simple fact that, without ever willing it to happen, Carrie herself had somehow become sixty-two years old?

And then her husband's angry bellow from inside the house: "Carrie! Where are you? What's this damn thing doing here?"

Carrie ran inside the house. There was her husband, flushed and angry, with that ruffled-sparrow look he got when he was excited, facing down a stranger. The doctor had arrived when she wasn't looking, and it was a new model.

If you looked at the doctor what you saw was a sandy-haired man of youthful maturity, with little laugh wrinkles at the corners of his eyes and the expression of smiling competence that doctors cultivated. If you touched him, his handshake was firm and warm. If you listened to his voice, that was also warm—it was only if you went so far as to sniff him that you could notice a

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possible lack. There was no human scent of body and sweat. That meant a very recent shower, a foolproof deodorant—or a robot.

And, of course, a robot was what it was. "Oh, come on, Fee," she coaxed, anxiously good-humored, "you know it's just a doctor come to check your blood pressure and so on."

"It's not my *regular* doctor!" roared the congressman, standing as tall and strong as possible for a man who, after all, was a shade shorter than Carrie herself. "I want *my* doctor! I've had the same doctor for thirty-five years, and that's the one I want now;"

It was so bad for him to get upset right before the kickoff debate! "Now, Fee," Carrie scolded humorously, trying to soothe him down, "you know that old dented wreck was due for the scrapheap. I'm sure that Doctor—uh—" She looked at the new robot for a name, and it supplied it, smilingly self-assured.

"I am Doctor William," it said. "I am a fully programmed Josephson-junction autonomous-intellect model robot, Mr. Congressman, with core storage for diagnostics, first aid, and general internal medicine, and of course I carry datachip memory for most surgical procedures and test functions."

The congressman's cheeks had faded from red to pink; he was not generally an irascible man. "All the same," he began, but the robot was still talking.

"I'm truly sorry if I've caused you any concern, Mr. Congressman. Not only for professional reasons," it added warmly, "but because I happen to be one of your strongest supporters. I haven't yet had the privilege of voting in a congressional election, I'm sorry to say, because I was only activated last week, but I certainly intend to vote for you when I do."

"Huh," said O'Hare, looking from the robot to his wife. And then the reflexes of half a century took over. "Well, your time's valuable, Doctor William," he said, "so why don't we just get on with this examination? And we can talk about the problems of this district while we do. As I guess you know, I've always been a leader in the fight for robot rights—" And Carrie slipped gratefully away.

Fiorello O'Hare's vote-getting skills had been tested in more than two dozen elections, from his first runs for the school board and then the county commission—a decade before Carrie had been old enough to vote—through twenty-two terms in the Congress of the United States. Twenty-two terms: from the old days when a congressman actually had to get in a plane or a car and go to Washington, D.C., to do his job, instead of the interactive-electronics sessions that had made the job attractive again. And against twenty-two opponents. The opponents had come in all shapes and sizes, pompous old has-beens when O'Hare was a crusading youth, upstart kids as he grew older. Male or female, black or white, peaceniks and pro-lifers, spenders and budget-balancers—O'Hare had beaten them all. He had, at least, beaten every one of them who dared contest the Twenty-Third Congressional District. He had not done as well the time he made the mistake of trying for Governor (fortunately in an off year, so his House seat was safe), and not well at all the time

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when he had hopes for the Senate, even once for the vice-presidency. The primaries had ended one of those dreams. The national convention slew the other. O'Hare learned his lesson. If he stayed in Congress he was safe, and so were his committee chairmanships and his powerful seniority.

After all these years, Caroline O'Hare could no longer remember by name all the opponents her husband had faced. If she could dredge them out of her recollections at all, it was by a single mnemonic trait. This one was Mean. That one was Hairy. There was a Big and a Scared and a Dangerous. Classified in those terms, Carrie thought as they swept into the underground garage of the Shriner's Auditorium, this year's opponent was a Neat. He wore a neat brown suit with a neatly tied brown scarf and neatly shined brown shoes. He was chatting, neatly, with a small and self-assured group of his supporters as the O'Hares got out of their car and approached the elevator, and when he saw O'Hare he gave his opponent a neat, restrained smile of welcome.

The neat opponent was riding on a record of six years as the very successful mayor of a small city in the district, Mayor Thom had been quite a vote-getter in the home town, according to the datafile printout Carrie had ordered. Her husband disdained such things—"I'm a *personal* man, Carrie, and I deal with the voters *personally*, and I don't want to hit key issues or play to the demographics, I want them to know *me*." But he must have retained a little something for, when he saw the other party, he hurried over, smile flashing, speech ready on his lips. "A great pleasure to see you here, Mr. Mayor," he cried, pumping the mayor's hand, "and to congratulate you again on the fine job you've been doing in Elk City!"

"You're very kind," smiled Mayor Thom, nodding politely to Carrie—neat nod, neat smile, neat and pleasant voice.

"Only truthful," O'Hare insisted as the elevator door opened for them. "Well, it's time to do battle, I guess, and may the best man win!"

"Oh, I hope not," the mayor said politely. "For in that case, as I am mechanical, it would surely be you."

O'Hare blinked, then grinned ruefully at his wife. Cordiality toward his opponents was an O'Hare trademark. It cost nothing, and who knew but what it might soften them up? Not many opponents had played that back to O'Hare. Carrie saw him pat the mayor's arm, stand courteously aside as they reached the auditorium floor, and bow the other party out. But his expression had suddenly become firm. He was like a current breaker that had felt a surge of unexpected and dangerous power. It had opened unaware, but now it had reset itself. It would be ready for the next surge.

But actually, when the surge came, O'Hare wasn't.

The first rounds of the debate went normally. It wasn't really a true debate, of course. It was more like a virtuoso-piece ballet, with two prima ballerinas each showing off her own finest bits. A couple of perfect *entrechats* matched by a string of double *fouettes*, marvelous *gran jete* countered by a superb *pas en aire*. O'Hare went first. His greatest strengths were the battles he had won,

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the fights he had led, the famous figures he had worked with. Not just politicians. O'Hare had been the intimate of ambassadors and corporation tycoons and scientists—he had even known Amalfi Amadeus himself, the man who had given the world cheap hydrogen fusion power and made the modern Utopia possible. O'Hare got an ovation after his first seven-minute performance. But so did his opponent. The mayor was a modest and appealing figure; how handsome they made robots these days! The mayor, talking about its triumphs in Elk City, had every name right, every figure detailed; how precise they made them! What O'Hare offered in glamor, the Mayor made up in encyclopedic competence . . . and then Carrie saw how the trick was done.

Against all advice, the congressman in his second session was telling the audience about the highlights of their summer photo safari along the Nile. Against Carrie's expectations, the audience was enjoying it. Even the mayor. As O'Hare described how they had almost, but not quite, seen a living crocodile and the actual place where a hippopotamus had once been sighted, the mayor was chuckling along with everyone else. But while it was chuckling it was reaching for its neat brown attache case; opened it, pulled out a module of data-store microchips, opened what looked like a pocket in the side of its jacket, removed one set of chips and replaced them with another.

It was plugging in a new set of memories! How very unfair! Carrie glanced around the crowded audience to see if any of the audience were as outraged as she, but if they were they didn't show it. They were intent on the congressman's words, laughing with him, nodding with interest, clapping when applause was proper. They were a model audience, except that they did not seem to notice, or to care about, the unfairness of the mayor. But why not? They certainly looked normal and decent enough, so friendly and so amiable and—

So neat.

Carrie's hand flew to her mouth. She gazed beseechingly at her husband, but he was too wily a campaigner to have failed to read the audience. Without a hitch, husbanding his time to spend it where it would do the most good, he swung from the pleasures of the summer holiday to the realities of his political life. "And now," he said, leaning forward over the lectern to beam at the audience, "it's back to work, to finish the job you've been electing me for. As you know, I was one of the sponsors of the Robot E.R.A. A lot of voters were against that, in the old days. Even my friends in political office advised me to leave that issue alone. They said I was committing political suicide, because the voters felt that if the amendment passed there would be no way anybody could tell the difference between a human and a mechanical any more, and the country would go to the dogs. Well, it passed—and I say the country's better off than ever, and I say I'm proud of what I did and anxious to go back and finish the job!" And he beamed triumphantly at his opponent as the applause swelled and he relinquished the floor.

But the mayor was not in the least disconcerted. In fact, he led the clapping. When he reached the podium he

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cried, "I really thank you, Congressman O'Hare, and I believe that now every voter in the district, organic and mechanical alike, knows just how right you were! That amendment did not only give us mechanicals the vote. It not only purged from all the datastores any reference to the origins of any voter, mechanical or organic, but it also did the one great thing that remained to do. It freed human beings from one more onerous and difficult task—namely, the job of selecting, alone, their elected officials. What remains? Just one thing, I say—the task of carrying this one step further, by electing mechanicals to the highest offices in the land, so that human life can be pure pleasure!"

And the ovation was just as large. The mayor waited it out, smiling gratefully toward O'Hare, and when the applause had died away it went on to supply specifics to back up its stand—all dredged, Carrie was sure, out of the store of chips she had seen it plug in.

On the stage, her husband's expression did not change, but Carrie saw the eyes narrow again. The relay had popped open once more and reset itself, snick-snick; O'Hare knew that this opponent was a cut above the others. This campaign was not going to be quite like those that had gone before.

And it indeed it wasn't, although for the first few weeks it looked as though it would have the same sure outcome.

By the first of October the congressman was hitting his stride. Three kaffeeklatsches a day, at least one dinner every evening—he had long ago learned how to push the food around his plate to disguise the fact that he wasn't eating. And all the hundreds of block parties and TV spots and news conferences and just strolling past the voters. The weather turned cooler, but still muggy, and the outdoor appearances every day began to worry Carrie. The congressman's feet would never give out, or his handshake, or his smile muscles. What was vulnerable was his voice. Up on a street-corner platform his enemies were the damp wind and the sooty air. Walking along a shopping block, the same—plus the quiches and pitas, the ravioli and the dim sum, the kosher hot dogs and sushi—the whole spectrum of ethnic foods that an ethnic-wooing candidate traditionally had to seem to enjoy. "The tradition's out of date," Carrie told him crossly, throat lozenges in one hand and anti-acid pills in the other as he gamely tried to recuperate before going to bed, "when half the voters are robots!"

Her husband sat on the edge of their bed, rubbing his throat and his feet alternately. "It's the organics I need, love. The robots know where I stand!"

They also knew, Carrie thought but did not say, that his opponent was one of them. . . . But robots were programmed to be fair! Poring over the daily polls after her husband had gone to sleep, Carrie almost felt confidence that they were. The congressman's reliable old polling service was also his driver, Martin, an antique remote-intelligence robot which needed only to query the central computation faculty to get the latest data on election moods. Or, indeed, on anything else; and it was the robot's custom to lay a printout of the last polling data on Carrie's dressing table every night. Indeed, the graphs did not look bad. Thirty-eight percent for

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her husband, only 19% for Mayor Thom—

But what they also showed was a whopping 43% undecided, and the fly in the ointment was that the "undecideds" were overwhelmingly robots. Carrie understood why this was so; it had been so ever since her husband's Robot E.R.A. passed and the autonomous-intelligence models got the vote. Robots did not like to hurt anyone's feelings. When robots were required to make a choice that might displease someone, they postponed it as long as they could. For robots were also programmed to be polite.

And if all that 43% came down for Mayor Thom—

Carrie simply would not face that possibility. Her husband was *happy* in his job. The Congress of the United States was an honorable career, and an easy one, too, not a small consideration for a man in his seventies who was now coughing fitfully in his sleep. In the old days it had been a mankiller. There was always so much to do, worrying about foreign powers, raising taxes, trying to give every citizen a fair share of the nation's prosperity—when there was any prosperity—at least, trying to give each one enough of a constant and never adequate supply of the available wealth to keep them from rioting in the streets. But since Amadeus's gift of power, with all the limitless wealth it made available to everyone, a congressman could take pleasure in what he did, and if he chose not to do it for a while—to take a summer off for a photo safari along the Nile, for instance—why, where was the harm?

She slept uneasily that night.

* * *

Where the congressman went, Carrie went too, even to a factory district far out of town, even when greeting the early shift meant being there at five-thirty in the morning. The sign over the chain-link fence said:

AMALFI ELECTRIC, INC.
A Division of
Midwest Power & Tool Corp.

and as they approached the managing director hurried out to greet them. "Congressman O'Hare!" he fawned. "And, yes, your lovely lady—what an honor!" He was a nervous, rabbity little man, obviously human; his name, Carrie knew from the briefing Marty had provided as they turned into the parking lot, was Robert Meacham. The briefing also said that he was the kind who could keep you talking while the whole shift passed by on the other side of the fence, so Carrie moved forward to engage him even while the congressman was still pumping his hand.

It was no trick for Carrie to find things to talk about while the congressman wooed Meacham's workers, not with Carrie's photographic—really more than photographic, almost robotic—memory for the names of wives, children, and pets. By the time she had finished discussing Meacham's two spaniels, the congressman had finished with his workers and the alert Marty was moving the car in to pick him up. Meacham detained Carrie a moment longer. "Mrs. O'Hare, can I ask you something?"

"Of course, Mr. Meacham," she said, wishing he wouldn't.

"Well—I can see why your husband goes after the late-model robots. They've got the vote. Besides, it's not that easy to tell them from real people anyway.

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But there's a lot of pre-Josephson models working on our line. They don't have any individual intelligence—they're radio-linked to the central computers, you know, like your driver. And they don't even have a vote!''

''I can see,'' said Carrie benignly, trying not to lose his vote but unwilling to refrain from setting him straight, ''that you don't know the congressman very well. He doesn't do this just for votes. He does it for love.''

And indeed, that was true. And as October dwindled toward Hallowe'en, what dampened the sparkle in the congressman's eye was the first hint—not really a hint, hardly more than a suspicion—of love unrequited. For the polls were turning, like the autumn leaves, as the ''undecideds'' began to decide. He began to consult Marty's datalink reports more and more frequently, and the more he studied them the more a trend was clear. Every day the congressman picked up some small fraction of a percentage point, it was true. But the mayor picked up a larger one.

As Marty drove them to yet another factory, it extruded a hard-copy of the latest results from the tiny printer in its chest and passed it back to the congressman wordlessly. O'Hare studied the printout morosely. ''I didn't think it was going to work out this way,'' he admitted at last. ''It seems—it actually seems as though the enfranchised mechanicals are bloc-voting.''

''You'd think they'd do their bloc-voting for the man who gave them the Robot E.R.A.,'' Carrie said bitterly, and bit her tongue. But O'Hare only sighed and stared out at the warm, smoggy air. His wife thought dismally that the congressman was at last beginning to show his age.

That morning's factory was a robot-robot assembly plant. Robots were the workers, and robots were the product. Some of the production bays were a decade old and more, and the workers were CIMs—Central Intelligence Mechanicals, like their old driver Marty. Their dented old skulls housed sensors and communications circuits, but no thought. The thinking took place in an air-conditioned, vibration-proof, and lightless chamber in the bedrock under the factory floor, where a single giant computer ran a hundred and ninety robots. But if the bulk of the workers were ancient, what they produced was sparkly new. As they drove up, Carrie saw a big flatbed truck hauling away. It was furnished with what looked like pipe racks bolted to the bed, and in each niche in the pipes a shiny new Josephson-junction autonomous-intellect robot had harnessed itself to the rack and lapsed into power-down mode for the trip to the distribution center. There were more than a hundred of them in a single truckload. A hundred votes, Carrie thought longingly, assuming they would all stay in the Twenty-Third Congressional District . . . but she was not surprised, all the same, when she observed that the congressman was not thinking along precisely those strategic lines.

She sighed fondly, watching him as he did what she knew he was going to do. He limped down the line of CIMs, with a word and a smile and a handshake for each . . . and not a vote in the lot of them. It was not a kindly place for

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a human being to be, noisy with the zap of welding sparks, hot, dusty. This was where the torsos were assembled and the limbs attached and the effector motors emplaced. The growing, empty robot bodies swung down the line like beeves at a meat-packer's. Fortunately the CIMs had only limited capacity for small talk, and so the congressman was soon enough in the newer, cleaner detailing bays. The finishing touches were applied here. The empty skulls were filled with the Josephson-junction data processors that were their "brains." The freezer units that kept the cryo-circuits working were installed, and into the vacant torsos went the power units that held hydrogen-fusion reactors contained in a chamber of quarks the size of a thimble. The congressman's time was not wasted here. Every one of these workers was a voter, an enfranchised robot as new and remarkable as the ones they made. Along that line the robots being finished began to twist and move and emit sounds, as their circuits went through quality-control testing, until at the end of the line they unhooked themselves from the overhead cable, stepped off, blinked, stood silent for a moment while their internal scanners told them who and what they were, and why. . . .

And the congressman's eyes gleamed as he perceived them as they perceived themselves. New beings. New voters!

It was the right place for the congressman to be: a greeting for each new voter, a handshake . . . a vote. Carrie hated to try to pull him away, but Martin was looking worried and the schedule had to be met. "Oh, Carrie," he whispered as she tugged at his sleeve, "they're *imprinting* on me! Just like the ducklings in *King Solomon's Ring*! I'm the first thing they see, so naturally they're going to remember me forever!"

He was not only happy, he was flushed with pleasure. Carrie hoped that was what it was—pleasure, and not something more worrisome. His eyes were feverishly bright, and he talked so rapidly he was tripping over his words. She was adamant; and then, once she got him into the car, less sure. "Dear," she ventured, as Martin closed the door behind them, "do you suppose you could possibly cancel the Baptist Men's Prayer Breakfast?"

"Certainly not," he said inevitably.

"You really do need a rest—"

"It's only a week till the election," he pointed out reasonably, "and then we'll rest as much as you like—maybe even back to the Sahara for a few days in the sun. Now, what are you going to do?"

She stared at him uncertainly. "Do when?"

"Do now, while I go see the Baptists—it's a *men*'s breakfast, you know."

For once he had caught Carrie unprepared. Gender-segregated events were so rare that she had simply forgotten about this one. "Martin can drop me off and take you home, if you like," her husband supplied, "but of course it's going the wrong way—"

"No." She opened the door on her side, kissed her husband's warm cheek—too warm? she wondered—and got out. "I'll take a cab. You go ahead."

And she watched her husband pull out of one end of the parking lot just as the six-car procession she had seen coming

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down the far side of the fence entered at the other.

The mayor.

It was the old days all over again, the next thing to a circus parade. Six cars! And not just cars, but bright orange vehicles, purpose-built for nothing but campaigning. The first was an open car with half a dozen pretty young she-robots—no! They were human, Carrie was sure!—with pretty girls tossing pink and white carnations to the passersby. There were not many passersby, at that hour of the morning, but the mayor's parade was pulling out all the stops. Next another open car, with the neat, smiling figure of the mayor bestowing waves and nods on all sides. Next a PA car, with a handsome male singer and a beautiful female alternating to sing all the traditional political campaign numbers, *Happy Days Are Here Again* and Schiller's *Ode to Joy* and *God Bless America* with an up-tempo beat. And then two more flower-girl cars, surrounding a vehicle that was nothing more than a giant animated electronic display showing the latest and constantly changing poll results and extrapolations. All, of course, favoring the mayor. How gross! And how very effective, Carrie conceded dismally to herself. . . . "You the lady that wants the taxi?" someone called behind her, and she turned to see a cab creeping up toward her. Reliable Martin had sent for it, of course. She sighed and turned to go inside it, and then paused, shaking her head.

"No, not now. I'll stay here a while."

"Whatever you say, lady," the driver agreed, gazing past her at the mayor's procession. He was only a central-intelligence mechanical, but Carrie was sure she saw admiration in his eyes.

The mayor had not noticed her. Carrie devoted herself to noticing him, as inconspicuously as she could. He was repeating her husband's tour of the plant—fair enough—but then she saw that it was not fair at all, for the mayor had a built-in advantage. It too was a robot. In her husband's tour of the plant he had given each worker a minute's conversation. The mayor gave each worker just as much conversation, but both it and the workers had their communications systems in fast mode. The sound of their voices was like the sonar squeaks of bats. The pumping of arms in the obligatory handshake like the flutter of hummingbird wings, too fast for Carrie's eyes to follow.

A voice from behind her said, "I know who you are, Mrs. O'Hare, but would you like a carnation anyhow?"

It was one of the flower girls—not, however, one of the human ones from the first car, for human girls did not have liquid-crystal readouts across their foreheads that said *Vote for Thom!*

There was no guile in its expression, no hidden photographer waiting to sneak a tape of the congressman's wife accepting a flower from the opponent. It seemed to be simple courtesy, and Carrie O'Hare responded in kind. "Thank you. You're putting on a really nice show," she said, her heart envious but her tone, she hoped, only admiring. "Could you tell me something?"

"Of course, Mrs. O'Hare!"

Carrie hesitated; it was her instinct to be polite to everyone, robots included—her own programming, of course. How to put what she wanted to

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know? "I notice," she said delicately, "that Mayor Thom is spending time even with the old-fashioned mechanicals that don't have a vote. Can you tell me why?"

"Certainly, Mrs. O'Hare," the flower girl said promptly. "There are three reasons. The first is that it looks good, so when he goes to the autonomous-intellect mechanicals they're disposed in his favor. The second is that the mayor is going to sponsor a bill to give the CIMs a fractional vote, too—did you know that?"

"I'm afraid I didn't," Carried confessed. "But surely they can't be treated the way humans or Josephson-junction mechanicals are?"

"Oh, no, not at all," it agreed, smiling. "That's why it's only a fractional vote. You see, each of the CIMs is controlled by a central computer that is quite as intelligent as any of us, perhaps even more so; the central intelligence has no vote at all. So what Mayor Thom proposes is that each of the CIMs will have a fraction of a vote—one one hundred and ninetieth of a vote, in the case of the workers here, since that's how many of them the plant computer runs. So if they all vote, the central computer will in effect have the chance to cast a ballot on its own—you know the old slogan, Mrs. O'Hare, one intelligence, one vote!"

Carrie nodded unhappily. It made sense—it was exactly the sort of thing her husband would have done himself, if he had thought of it. But he hadn't. Maybe he was getting past the point of thinking up the really good political ideas any more. Maybe— "You said there were three reasons."

"Well, just the obvious one, Mrs. O'Hare. The same reason as your husband does it. It's not just for votes with the mayor. It's love." The she hesitated, then confided, "I don't know whether you know this or not, Mrs. O'Hare, but autonomous-intellect mechanicals like Mayor Thom and I have a certain discretion in our behavior patterns. One of the first things we do is study the available modes and install the ones we like best. I happen to have chosen nearly twenty per cent you, Mrs. O'Hare. And the mayor—he's nearly three-quarters your husband."

There is a time for all things, thought Carrie O'Hare as she walked over to the mayor's procession to ask them to call her a cab. There is a time to stay, and a time to go, and maybe the time to stay in office was over for Fiorello Delano Fitzgerald O'Hare. Some of the robots her husband had greeted as they came off the assembly line were standing in a clump, waiting, no doubt, for the arrival of the next truck to bear them away. They waved to Carrie. She responded with a slight decrease of worry—they were sure votes, anyway. Unless—

She stopped short. What was the mayor doing with them? She gazed incredulously at the scene, like a high-speed film, the Mayor thrusting a hand into a pouch, jerking it out, swiftly passing something that shone dully to the robot he was talking to and moving briskly to the next . . . and then, without willing it, Carrie herself was in high-speed mode, almost running toward the mayor, her face crimson with rage. The Mayor looked up as she approached and

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politely geared down. "Mrs. O'Hare," it murmured, "how nice to see you here."

"I'm *shocked!*" she cried. "You're *brainwashing* them!"

The mobile robot face registered astonishment and what was almost indignation. "Why, certainly not, Mrs. O'Hare! I assure you I would never do such a thing."

"I saw you, Mayor Thom. You're reprogramming the robots with datachips!"

Comprehension broke over the mayor's face, and it gestured to the she-robot who had given Carrie the flower. "Ah, the chips, yes. I see." It pulled a chip out of the pouch and passed it to the she with a burst of high-speed squeaks. "Oh, I beg your pardon, Mrs. O'Hare. Let me repeat what I just said in normal mode. I simply asked Millicent here to display the chip contents for you."

"Sure thing, Mayor," smiled Millicent, tucking the chip under the strap of its halter top. The running message on Millicent's forehead disappeared, and the legend appeared:

The Constitution of the
United States of America

We, the people of the United States, in order to form a more perfect Union, establish justice, insure domestic tranquility, provide for the common defence—

"Move it on, please," ordered the mayor. "Search 'O'Hare.' Most of it," it added to Carrie, "is only the basic legislation, the Constitution, the election laws and so on. We don't get to your husband until—ah, here it is!" And the legend read:

H.R. 29038, An Act to Propose a Constitutional Amendment to grant equal voting rights and other civil rights to citizens of mechanical origin which satisfy certain requirements as to autonomy of intellect and judgment.

"The Robot E.R.A.," Carrie said.

"That's right, Mrs. O'Hare, and of course your husband's name is on it. Then there's nothing about him until—advance search, please, Millicent—yes. Until we come to his basic biographical information. Birthplace, education, voting record, medical reports and so on—"

"Medical reports! That's confidential material!"

The mayor looked concerned. "Confidential, Mrs. O'Hare? But I assure you, the data on myself is just as complete—"

"It's *different* with human beings! Fiorello's doctor had no business releasing that data!"

"Ah, I see," said the mayor, nodding in comprehension. "Yes, of course, that is true for his present doctor, Mrs. O'Hare. But previously the congressman made use of a CIM practicioner—a robot whose central processing functions took place in the general data systems, and of course all of that is public information. I'm sorry. I assumed you knew that. Display the congressman's medical history," it added to the she, and Carrie gazed at the moving line of characters through tear-blurred eyes. It was all there. His mild tachycardia, the arthritis that kicked up every winter, the

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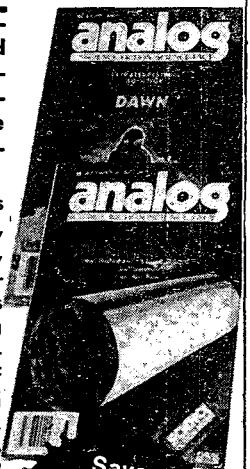

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asthma, even the fact that now and then the congressman suffered from occasional spells of constipation.

"It's disgusting to use his illnesses against him, Mayor Thom! Half of his sickness was on behalf of you robots!"

"Why, that's true, yes," the mayor nodded. "It is largely tension-induced, and much of it undoubtedly occurred during the struggle for robot rights. If you'll look at the detailed record—datum seventy-eight, line four, please Millicent—you'll see that his hemorrhoidectomy was definitely stress-linked, and moreover occurred just after the Robot E.R.A. debate." The expression on the mayor's face was no longer neat and self-assured; it was beginning to be worried. "I don't understand why you are upset, Mrs. O'Hare," Thom added defensively.

"It's a filthy trick, that's why!" Carrie could feel by the dampness on her cheeks that she was actually weeping now, and mostly out of helpless frustration. It was the one political argument her husband could never answer. It was obvious that the strain of the Robot E.R.A. had cost Congressman O'Hare in physical damage, and the robots would understand that, and would behave as programmed. They served human beings. They spared them drudgery and pain. They would, therefore, remove him from a task which might harm him—not out of dislike, but out of love. "Don't you see it's not like that any *more*?" she blazed. "There's no strain to being in Congress any more—no tax bills to pass, no foreign nations to arm against, no subversives to control—why, if you look at the record you'll see that his doctor *urged* Fiorello to run again!"

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"Ah, yes," the mayor nodded, "but one never knows what may come up in the future—"

"One damn well does," she snapped. "One knows that it'll break Fee's heart to lose this election!"

The mayor glanced at the she-robot, then returned to Carrie. Its neat, concerned face was perplexed and it was silent for a moment in thought.

Then it spoke in the bat-squeak triple time to the she, which pulled the chip out of its scanning slot, handed it to the mayor, and departed on a trot for the van with the poll displays. "One moment, please, Mrs. O'Hare," said the mayor, tucking the chip into its own scanner. "I've asked Millicent to get me a datachip on human psychogenic medicine. I must study this." And it closed its eyes for a moment, opening them only to receive and insert the second chip from the she.

When the mayor opened its eyes its expression was—regret? Apology? Neither of those, Carrie decided. Possibly compassion. It said, "Mrs. O'Hare, my deepest apologies. You're quite right. It would cause the congressman great pain to be defeated by me, and I will make sure that every voting mechanical in the district knows this by this time tomorrow morning."

There had to be right words to say, but Carrie O'Hare couldn't find them. She contented herself with "Thank you," and then realized that those had been the right words after all . . . but was unable to leave it at that. "Mayor Thom? Can I ask you something?"

"Of course, Mrs. O'Hare."

"It's just—well, I'm sure you realize that you people could easily beat my husband if you stuck together. You could probably do that in nearly every election in the country. You could rule the nation—and yet you don't seem to go after that power."

The mayor frowned. "Power, Mrs. O'Hare? You mean the chance to make laws and compel others to do what you want them to? Why, good heavens, Mrs. O'Hare, who in his right mind would want that?"

Carrie shook her head in puzzlement. "I thought you did," she said. "Otherwise why have you been running for office at all?"

The mayor smiled its neat smile. "I am programmed for service," it said, "and that is the service I am designed to render. To program us for power would mean some very basic changes. No such changes," it said politely, "have ever been put into effect. Yet."

- Poverty: An unhappy state that persists as long as anyone lacks anything he would like to have.
- Statistics: A system for expressing your political prejudices in convincing scientific guise.
- Unfair competition: Selling cheaper than we do.
- Zero defects: The result of shutting down a production line.

The Management Dictionary, Kelvin Throop III

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Concerning CompuOrganics and the Ultimate Personal Computer: An Admission and Some Revelations

Michael A. Banks

If "CompuOrganics" doesn't ring a bell with you, dig out your copy of the November 9, 1981 issue of *Analog*. Check page 110; you'll find an advertisement thereon for "The First Personal Computer With True Intelligence." If you haven't already read the ad, do so.

Right. The "advertisement" is a euphemistic description, of sorts, of the Human Brain and Body, in computer terms. You probably realized that as soon as you began reading the ad . . . or did you?

Most of *Analog*'s readers who responded to the ad did indeed "get the joke." Some few didn't. In any event, we'd like to share some of their responses here.

First, for those of you who may be interested, here is a little background on where the idea for the advertisement came from.

Like everyone, I used to see the ads in the backs of magazines selling all manner of strange and wondrous gadgetry which couldn't possibly exist. My favorite was the one (actually there have been several) offering an anti-gravity device. Back in 1978 I started wondering, "What if these ads were for real?" I didn't spend the money to find out, but I *did* write a story ("Horseless Carriage") describing just how someone who had invented a *workable* anti-gravity device was forced to use such ads to sell the device.

The problem, you see, was that no one believed that the anti-gravity device was for real—everyone thought it was some kind of a hoax. So the inventor's agent went looking for a market of people who wanted to believe in such things as anti-gravity gadgets, and found it.

The advertisement for the Advanced

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Personal Computer is basically an inversion of that idea, the result of a brainstorm. How many people, I wondered, would be interested in obtaining the Human Brain and Body if these were described in perfectly honest, though euphemistic, terms? No overt deception—just something simple and familiar out of context.

As of this writing (late December 1981), we've had 238 responses to the CompuOrganics ad, and there will probably be more. The volume of response probably says something about the interest *Analog* readers have in computers, or about their habits of responding to mail-order ads. More interesting, though, than the quantity of the response was the quality. That is, the responses which were more than just a simple "Please send me more information on the Advanced Personal Computer."

Most of you were on to the hoax, but some few were (or *seemed* to be) genuinely interested in obtaining information on this new computer. Thirteen percent, in fact, appeared to take the ad for real, and among that 13% were eight computer-related companies, judging by the letterheads. Five percent of you admitted to having read the ad through once or twice before realizing what was going on.

The types of responses were varied —and humorous. The most prevelant type (50.8%) was a letter complaining about the poor documentation and performance of the writer's "Model B" and citing performance parameters that we had left out of the original ad. For example, a West Coast respondent complained of "the excessive amount of downtime" of his unit, adding that it spent a full third of its operational life in a "passive regenerative mode" (*aka* "sleep"). He further complained of unexpected lapses in efficiency caused by unfavorable interaction with other Advanced Personal Computers.

Other complaints included the fact that the units do not operate at maximum efficiency during the basic programming period of 18 years, and that the fueling and waste-disposal units are inefficient. Of particular dislike is the fact that current requirements for the APC call for highly processed fuel available only at selected outlets at inflated prices.

On the other hand, some of you were quick to point out some of the positive features of the APC that we had neglected to mention in the ad. A British writer listed manual print-out capability (upper- or lower-case, or cursive) and multi-function servo operation.

The second most frequent type of response was that requesting "custom" APC models. These ranged from "Do you have one with a good figure that can cook?" to detailed specifications. Most of the latter might well be termed chauvinistic, however. An institution by the name of "Maison D' Joie" wrote in with a request for several hundred APC units, sub-type "F", with custom chassis and "customer"-oriented programming in ROM—all in the interest of automating the world's oldest profession.

Other requests for sub-type "F" were even more detailed, and one respondent, noting that he already had an APC subtype "M", wondered if there was a "plug-compatible" model available. All

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such responses, with one exception, were from males. The one exception was a female fan from California who entered her request for a sub-type "M" with clarity and dignity.

The fact that this type of response comprised 39% of the total might lead one to think that *Analog* readers are chauvinistic and preoccupied with sex. The latter may well be true, but overall, it would seem that there was less chauvinism involved than humor.

Among the most interesting of the responses were those claiming that CompuOrganics was infringing on someone else's patent or design. Outstanding among these was a brief note discussing the product-line of someone who signed himself (or herself) "God," followed by a large burn-mark. God rambled on with a little shop-talk before getting to the point. I.e., there may be a problem with parallel development among the respective engineering groups.

Less amicable was a letter from a real law firm, implying that CompuOrganics was infringing on the patent of Sirius Cybernetics Corp., who have allegedly been marketing a product identical to the APC under the trade-name Sapientis 5". Oh, well, so much for free enterprise and competition.

All of the foregoing came from science fiction readers. What, you may wonder, would be the response of an SF *writer?* One well-known author whose work appears frequently on these pages wrote to request an APC for evaluation (citing his long experience with the evaluation of new technology for the federal Department of Planned Obsolescence and Fingerpainting.) This author doubted, because of extensive research with models similar to that offered by CompuOrganics, that any APCs could be termed "intelligent," but was ready with full laboratory facilities for testing APCs to destruction (i.e., a Rubik's Cube with a missing internal cogwheel).

This same author requested the following specific configuration:

CPU Dust Cover/Thermal Insulator: Blonde

External Filter, Color Imaging System: Blue

Height of Main Frame: 167.6 cm.

Total Mass: 49.5 kg.

Total Circumference of Main Frame Dual Shock Bumpers at level of primary fluidics pump must exceed 91.4 cm.

Total Circumference of Posterior Rest Pads at level of Joy Stick input must also exceed 91.4 cm.

Another well-known SF author had a simpler request. He merely wanted an APC that could type better than his.

The remainder of the responses ranged from a research lab interested in research possibilities using APCs to a writer working on a book on artificial intelligence who requested all available information and a black-and-white photo for inclusion in his book.

The total effect of the responses was a little work and a lot of fun. One conclusion that may safely be drawn is this: The writers who appear in *Analog* are well matched in imagination by their readers!

(Those of you who did not respond may be wondering what sort of material *was* sent to those requesting information on how to order. It is reproduced here.)

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HOW TO ORDER
THE ADVANCED PERSONAL COMPUTER (MODEL "B")

Thank you for your inquiry regarding CompuOrganics' Advanced Personal Computer.

As indicated in our advertisement, our APC is the ultimate in personal computers, and even surpasses large mainframe computers in its capabilities. Also, the APC features true intelligence and self awareness.

If you studied the advertisement closely, you are aware that you already own a CompuOrganic APC. Every human being is issued one, although there are varients in ROM quantity and status in RAM capacity.

You may, however, feel that your APC is outmoded, or a bit worn. While we cannot be responsible for personal excesses or abuse, we do offer software support for outdated units. Reprogramming is, as with any computer, a time-consuming process, but you will find it to be a very rewarding activity.

If you are interested in additional programming for your APC, please contact any of the distributors in our extensive network. Distributors include any library, bookstore, university, or newsstand, and software covering any topic in any language is available.

We realize that some few of you may still be unaware of the location of your own APC. If this is true, please read the article on the Brain in the *Encyclopedia Britannica*. Supplementary reading on the Human Body may also be of use.

For those of you who have been using your APC and would like to order a second (or third), please be advised that any additional APC units will be self-aware and independent individuals, just like you. Therefore, extreme caution, planning, and foresight should be used in making the decision on ordering. You should also be aware that ordering any number of APC units obligates you to providing partial programming and full supply, maintenance, and care for the unit(s) for a period of 18 years or more.

Ordering additional APC units is a simple process in itself, but it requires that a complex series of negotiations and logistics operations be performed both before and after the order is placed. Space precludes a detailed discussion of the requirements, so we must refer you to your local library. There, you will find detailed instructions in books and encyclopedia entries under the following topic headings:

CHILDBIRTH	SEX	HUMAN REPRODUCTION
EDUCATION	FAMILY LIFE	MARRIAGE

Again, thank you for your inquiry.

Michael A. Banks
Ersatz Division
COMPUORGANICS

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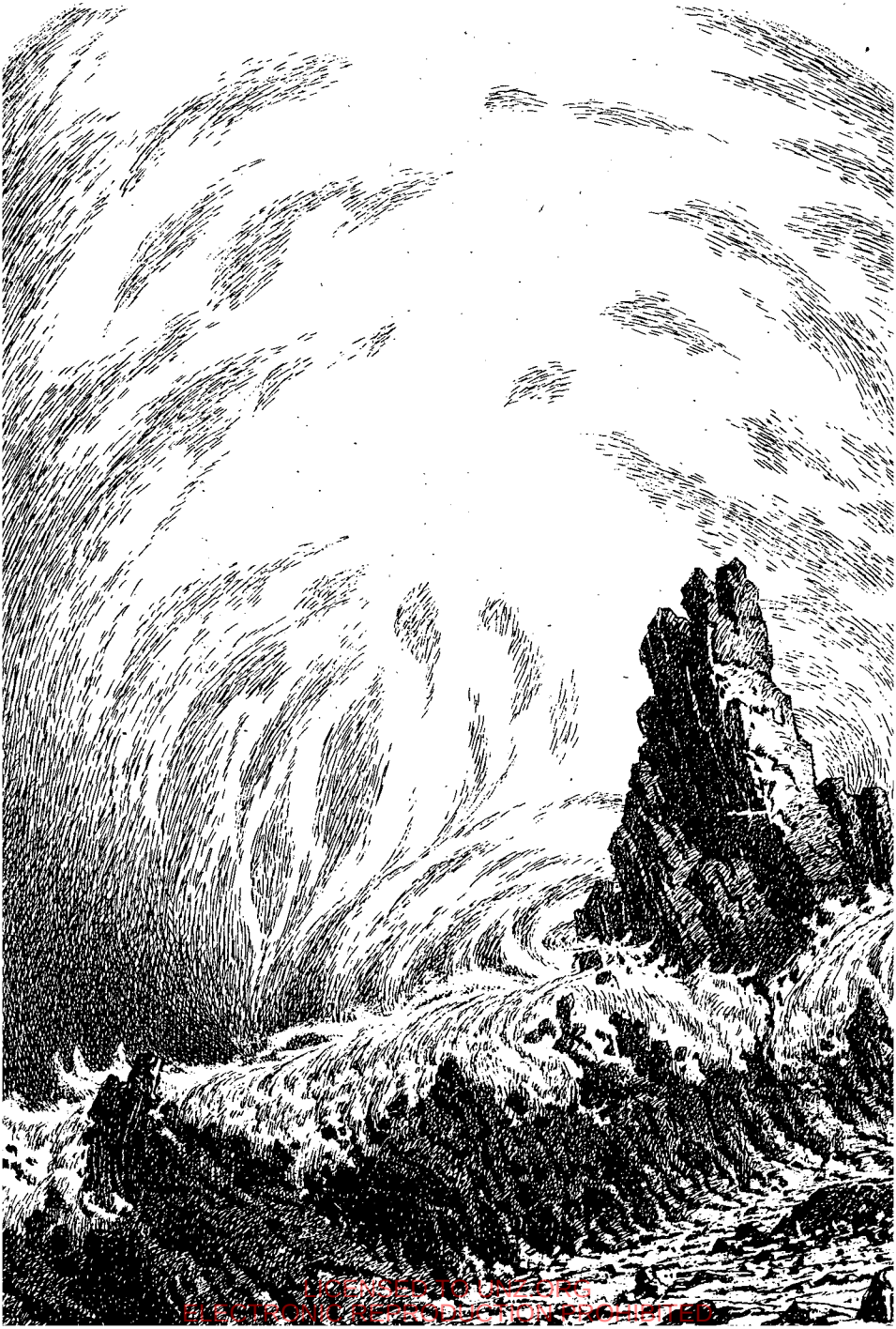

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Dr. Robert L. Forward Conclusion

ROCHEWORLD

A world as unusual as Rocheworld presents explorers with unique problems. And, if they're clever enough, unique solutions to match!

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SYNOPSIS

A circular interstellar lightsail spacecraft enters the Barnard Star system at 0.2 c. It separates into two pieces. The small inner payload section falls behind and turns to face the larger ring-sail that is left. A two-light-year-long slug of laser light sent from the solar system reflects off the ring-sail mirror and bounces back the other way to decelerate the payload sail and bring its crew to a halt in the Barnard system. Using the weak photons from the red dwarf star, General **Virginia "Jinjur" Jones** *and aging* **George Gudunov,** *the inventor of the laser-pushed lightsail, take their sailing ship on a grand tour of the Barnard planets. Then they rendezvous with the strangest planet in the system—Rocheworld.*

Rocheworld consists of two Titan-sized planetoids so close to each other that they are tidally locked and constantly face one another. Each planetoid is drawn into an egg shape by the strong gravity of the other so that the two planets are only eighty kilometers apart at the peaks. Although their surfaces do not touch, the two planetoids share a common atmosphere of methane, ammonia, and water vapor.

The Roche (Rock) lobe is slightly larger and, being the "highlands," is dry, while the smaller Eau (Water) lobe has captured all the water and is covered with an ammonia-water ocean that rises at the egg-shaped point into a rounded mountain of liquid 150-kilometers high with sixty-degree slopes. Chief Engineer **Gretchen Krupp** *and Computer Scientist/Musician* **David Greystoke** *check out one of the planetary landers carried by the lightsail, and heavy-lift pilots* **Veronica "Red" Vengeance** *and Capt.* **Thomas St. Thomas** *place the lander on the equator of the Roche lobe.*

Alien eyes float in the seas of Eau and watch the flare of light from the slowly falling rocket. A brain that is not a brain wonders at the phenomenon.

After George places the obligatory footprint on the dusty soil of Roche, geologists **Sam Houston** *and* **Richard Redwing** *explore the hills nearby, but find nothing unusual except a strange crystalline silica-gel type of rock. There is no evidence of life. The landing crew assembles and famed aerospace pilot* **Arielle Trudeau** *checks out the* Magic Dragonfly, *an all-purpose, nuclear-powered aerospace plane. It can hover on its electric lift-fans, fly through the air on its nuclear-heated jets, and take short hops through space using monopropellant rockets.* Dragonfly *has a semi-intelligent computer named* **Jill,** *who manipulates its environment with the Christmas Branch, a bush-like motile whose every sub-division is a replica of itself down to the cilia at the tips that move so fast they can make sound waves. Portions of the Christmas Branch can be detached and used for instrument repair and housekeeping. Each crew member has a hand-sized personal mini-branch in his hair or on his shoulder for direct communication with Jill.*

Leaving Thomas, Red, and Sam at Rocheworld Base, Arielle lifts Dragonfly *on its fans and takes the rest of the crew off to survey the double-planet. Most of the Roche lobe is like Mars, with a cratered outer pole and ice caps at the north and south spin poles, while*

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on the inner pole it is more like Io, with many volcanoes induced by the tidal stresses. Arielle flies Dragonfly *up from Roche to the zero-gravity midpoint, then dives down to explore the oceans on the Eau lobe. There is still no trace of life, not even algae or bacteria in the water. Jill's scanner notices a strange amber blob on the ocean surface, but it disappears. The exploration crew visits the "Hawaiian Islands" in the shallow backside seas of Eau, then start their return before "summer" sets in. Rocheworld is in a highly elliptical orbit around Barnard. George wants* Dragonfly *tethered on the Roche lobe next to the lander during the high winds expected at the close passage to the star.*

On their way back they find a region near the equator on Eau where the ocean is shallow due to a field of underwater volcanic vents. They are taking water samples when a storm arises. The strong coriolis forces from the six-hour rotation period of Rocheworld cause the storm to turn into a swarm of tornadoes. Arielle tries to fly them out of danger, but a tiny twister lifts one of the long glider-like wings of Dragonfly *and the other wing digs into the top of a 100-meter-high storm wave. The* Magic Dragonfly *crashes heavily into the deep trough in back of the wave.*

Arielle lifts a bloody face from the back of her bitten hand, spits out a tooth, and tries to raise Dragonfly *on its fans. Gretchen and Jill check out the airplane. The life support systems are secure, but the left lift fan is damaged. Now that* Dragonfly *is a boat instead of an airplane, Gretchen and Jill's motile replace the nose radar with a jury-rigged sonar. George holds a conference through the communication satellites with Thomas and Red back at Rocheworld Base, to try to find a way for them to get back to the lander. Red figures out that the ascent module can travel to the low-gravity point at the top of the water mountain, hover long enough to pick them off, and make it out to the L-5 point, where Jinjur can pick them up with the lightsail. Gretchen and Richard jury-rig an air conditioner fan in place of the damaged lift fan to push them slowly through the ocean to the top of the water mountain.*

The plodding Dragonfly *is found by two aliens,* **Roaring*Hot*Vermillion** *and* **Clear`White`Whistle,** *who talk with Jill through its new sonar. The aliens are floating, ten-ton amorphous blobs of colored jelly with the pixie souls of a porpoise and the mathematical brains of an Einstein. They ignore the humans in their spacesuits, for they are obviously mere dumb pets of the larger hard-shelled talking creature. The aliens start teaching Jill their language using mathematics and logic, but they soon get bored and go off surfing on a passing wave. The next time they return, Gretchen gets a sample of Clear `White `Whistle and finds that they are built along the lines of an ant colony. All the life forms on the planet—the aliens, their pets, their prey, and the "plants"—are formed from the same basic unit cell with different genetic "paint," depending upon which body they are in at the moment. The source of energy for the life on Rocheworld is not the dim red light from Barnard, but the high-energy sulphur compounds from the volcanic vents. Thus there is no life on the planet except near the vents.*

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Through Jill, the humans ask the aliens how they reproduce, and the aliens show them. **Warm@Amber@Resonance** *and* **Bitter # Green # Fizz** *arrive and join Clear `White `Whistle and Roaring*Hot*Vermillion. The four gather in a circle and stretch out tendrils to touch in the center. The center portion then twirls, extracting more and more of each alien body until a large, spiral, multicolored blob is formed. The "parents" pull back their genetic "essence," leaving a clear, lens-shaped blob of unpatterned life units. Spontaneously, a new light-blue genetic essence forms and spreads throughout the "baby," which immediately starts communicating using the passed-along knowledge of its "parents."*

The next day, Gretchen is out repairing the sonar and meets Clear `White `Whistle in person. The alien feels the sound of her voice coming through her helmet instead of being translated through Jill's sonar. Jill finally convinces the alien that the "dumb" humans are the masters, while Jill, who can "talk" with its sonar, is the "pet." Jill loads Gretchen's suit computer with a low-level language interpreter and Gretchen's robotic suit motile comes outside the suit to act as the sonic communication link. Gretchen can now talk directly with Clear `White `Whistle. The alien feels a big wave coming and decides to go surfing. Despite Richard's protests, Gretchen goes along, riding on top of the ten-ton monster.

During the long ride up the water mountain on the thirty-meter-tall wave, they get to discussing the stars and planets. Clear `White `Whistle has been trying to derive a law for the motions of the planets from the complex dynamics of the Barnard planetary system. Gretchen tells Clear `White `Whistle about the Newtonian inverse square law of gravity. The mathematical genius in the alien takes over and it decides it will solve the generalized n-body gravity force problem. Clear `White `Whistle stops surfing, squeezes the water out of its jelly-like body, turns into a dense white rock, and drops to the bottom of the ocean to think. The short three-hour day is nearly over and it is getting dark and cold.

"White Whistler!" Gretchen cries through her outside imp. "Come take me back to the plane! I can't swim twenty kilometers in my suit, even if I knew which direction to swim!"

There is no answer.

RESCUING

Gretchen tried again and even sent the suit imp swimming down to the bottom in an attempt to revive the white rock.

"I guess once you have dived into the complexity of the three-body problem you don't want to come up until you have it solved," she said to herself. "I guess I'd better just relax and wait until White Whistler finishes thinking and comes to pick me up again."

Gretchen set her suit heater on low to conserve power and closed her eyes to rest.

"I hope White Whistler isn't trying to solve the generalized n-body central force problem," she thought to herself as she drifted off to sleep.

A clear blue cloud strung through the

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cold water and wrapped itself around a red rock. There was a trilling sound as Dainty~Blue~Warble tried to attract the attention of the inactive older.

~It's time for another lesson, Old-one Roaring*Hot*Vermillion! What are you doing?~

It is!?! roared the red rock as it dissolved into a cloud. *Was just thinking of what to teach you next!*

Feathery red tendrils snaked out into the water, tasting each molecule.

Let me sniff. Know there was one around just a little bit ago.

Suddenly there was a reaction and, like a bloodhound on the scent, a portion of the cloud erupted into a long streamer that dragged the rest of the red body along. The blue cloud floated alongside. Suddenly the red cloud stopped, the tip of its streamer pointing stiffly off into the murky depths.

There's a Creepy:Stink! Sneak up on it! Ho! Ho!

~OK,~ said the blue cloud, imitating the motions of the older.

Wait! said the red-colored older, as the eager blue youngster started toward the slowly moving black slug plowing through the muddy bottom.

First sneak up only halfway! Then stop!

The blue cloud obeyed and stopped in the water about halfway to the Creepy:Stink.

*Now halfway again! Stop!

*Do it again!

*Will you catch it?

*Will you?

Dainty~Blue~Warble followed the instructions of the older, moving only halfway each time toward the slowly creeping blob of pungent meat. As the

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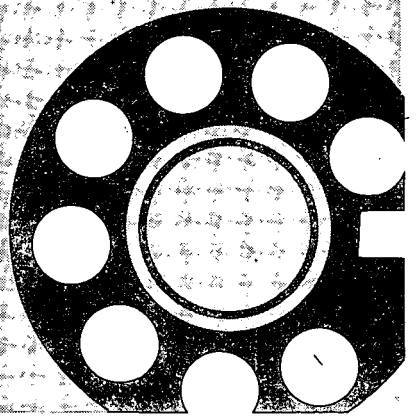

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gap lessened, the pauses at each halfway point became shorter.

Dainty~Blue~Warble controlled its fluid body well with its eager, learning intellect. Finally, in a swirl that was too fast to follow, the Creepy:Stink was gone.

Ho! Ho! Caught it, didn't you!

~I calculated that even though I only went halfway each time, my velocity was greater, and eventually I would catch up. So I ate it!~

Taste interesting?

There was an unnaturally long pause.

~Stinky!~

You'll get used to it. Hey! WAVE!!!

~Wave!~ warbled the youngling. Flowing smoothly into the older's wake, it surfed across the face of the shining sea.

"George? I'm worried," said Richard. "It's getting dark and Gretchen and White Whistler aren't back yet."

George looked out the cockpit window at Barnard. The short day was almost over and the tall tail of the *Magic Dragonfly* was casting a long shadow up the water mountain toward Roche as Barnard set behind them.

"Are any of the aliens around?" he asked Jill.

George could hear the sonar in the nose go through its search scan.

"Loud Red and Little Blue are coming this way."

"Ask them if they have seen Gretchen and White Whistler."

~Floating:Rock is calling us.~

Hi! We come closer! the loud voice roared through the water. The body of Roaring*Hot*Vermillion took on a more streamlined shape and zoomed off through the ocean, followed close behind by a pale blue arrow. The two drew to a halt in front of the chugging airplane.

"Where are White Whistler and the human Gretchen?"

Don't know. Orange:Hunters will find them! The red cloud gave a piercing whistle and soon three eager orange snakes came streaking through the water to dash themselves headlong into the red flesh of their master. After the obligatory free-for-all wrestling match was over, the Orange:Hunters listened to the complex commands coming from Roaring*Hot*Vermillion, then took off, making controlled crooning noises as they went.

"George," said Jill. "There's a message being relayed from Clete. The comsat says the signal is very weak and broken up, but it's getting stronger as the sun sets. Here is what we have so far."

"Gretchen calling comsats . . . Floating alone some twenty kil. . . . . istler rocked up and left me. Heater power getting low. Gretchen calling comsats. . . ."

"Can they get her position?" asked George.

"All they have are radio signals to work from," said Jill. "That puts her somewhere in a 100-kilometer circle. As soon as it gets darker the comsats will try to spot her helmet laser beacon. They've radioed to her suit imp to keep that going at high power."

"I'm going out to see if Loud Red will take me looking," said Richard, heading for the suit locker.

"It'll be pitch-dark soon," said

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George. "You won't be able to see a thing."

"No it won't!" boomed Jinjur's voice through George's imp. "*Prometheus* is over the dark side and I'm going to illuminate the search area with the reflection from the sail. I won't be able to keep it up all night without knocking myself out of position, but I should be able to give you a few hours' worth."

George peered up through the cockpit window and found the fat ellipse in the sky. As he watched, the ellipse brightened, and soon a tiny new sun was ablaze in the sky.

"I'm cycling through," said Richard. "Tell Loud Red that I'd like a ride."

"There's another message coming in from Gretchen," said Jill.

"*. . . heater power gone. Can't take the cold much longer . . . Must have dozed off . . . Barnard has risen again . . . Nope . . . it's* Prometheus. *Good seeing you guys, but I'm afraid it's too late. Awfully cold . . .*" There was a long pause, with the digital clatter of the suit imp and computer riding over the labored breathing and chattering teeth.

"The suit imp reports that Gretchen's torso temperature has dropped to 35 C, with extremities well below that," said Jill.

"*Wha! . . . White Whistler, you're back! . . . No . . . Orange blob . . . Stop bumping . . . Go 'way . . .*" There were sounds of heavy breathing, then the chattering teeth suddenly stopped.

"I think she's lost consciousness," said Jill.

"I hope those pets of Loud Red are strong enough to bring her back."

"They each weigh twice what Gretchen weighs," said Jill.

"I'm through the lock," said Richard. "Patch me through to Loud Red."

Jill stopped the engines and the *Magic Dragonfly* drifted to a stop in the ocean as Richard swam forward through the dimly lit seas toward the two aliens.

"Please carry me to Gretchen," he asked through Jill's sonar.

No. Orange:Hunters come. They bring human Gretchen here.

"But they'll take forever . . . a long time. She may die!"

She not die. She too hard. Cannot eat human, so human not die!

Suddenly Richard realized that the aliens had no concept of death except that of being assimilated in some predator's body. And since they were the dominant predator, with no natural enemies, they never died; just spent longer and longer times rocked up to think about more and more difficult logical problems until they finally gave themselves a problem that took an eternity to solve.

"Jill, convince that lazy red blob that we need to get Gretchen here in a hurry."

"I don't think we really need to," said Jill. "My sonar can detect the pets up ahead. They are moving this way at a respectable speed. I think they have Gretchen with them because the comsat trackers show a doppler velocity shift on their communication signal from her suit imp. Do you have your safety line on?"

"Of course," said Richard.

"Good," said Jill, starting the engines of the *Magic Dragonfly*. "See if you can catch the lock handholds as I

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go by. I'm going to save a few minutes by moving toward them."

"How's Gretchen?" asked Richard, puffing as he swam a few quick strokes and swung into the open door of the lock as it moved by.

"Not good. Torso temperature down to 30 C. The suit imp has dropped all power reserves and is running the last few grams of hydrogen through the fuel cell to get heat to the extremities before frostbite sets in."

Painful memories flooded back into Richard's mind as he recalled six hours of agony walking sock-footed through alpine snow carrying two unconscious tourists. He twitched his remaining eight toes in his boots. Would he like Gretchen less if she lost any of her toes? If she lived . . .

"Stop that, you ass," he remonstrated himself. "Get ready to cycle her through once those orange-colored hounds bring her in."

The smooth thump-thump of the large engine on the right and the pittidy-pittidy of the jury-rigged fan on the left stopped, and the *Magic Dragonfly* drifted to a halt. The second the current was less than his spacesuit swimming speed, Richard was through the door and breaststroking forward. The red alien was wrestling with his charges, and loud roars, shrieks, and whistles sounded through the ocean. Bobbing just below the surface of the water was a limp figure in a space suit, the arms and legs hanging downward, jerking limply as the waves tossed the body to and fro. Near the head of the body was a blurred bundle of twigs, waving frantically through the water in an attempt to drag the heavy carcass toward the airplane.

An orange blob hit Richard on the legs as it darted back into the fray, sending him tumbling in the water. Richard righted himself and stroked again to the distant limp form. He grabbed her by the belt and headed for the lock.

Once Richard had gotten Gretchen inside, George took charge. "Hold her by the waist while Arielle and I get her helmet off and her shoulders out!"

The helmet came off and a cold head dropped on Richard's shoulder as the subdued stink of a frozen, tortured body arose from the enclosed space. Richard held tight to the waist until the stiff arms were extracted from their casings. He switched to a chest-hold on the body while George, Arielle, and the Christmas Branch worked at detaching the bottom portion of the body from the plumbing. Richard's arms grew cold from the leaden breasts draped over his forearms.

"Turn her to the left so we can get her leg out," came the command from George.

Richard shifted his grip and easily turned the large body in the weak gravity of Eau, holding Gretchen by the waist and under the left arm. He looked down to see a deep depression in the soft under-flesh of the breast, the fatty tissue turned to clay by the cold. The suit came off.

"Okay! Out! We'll take it from here!" said George, pushing him forward through the privacy curtain as Arielle and the Christmas Branch started to strip the coveralls from the blue-cold body.

"How's she doing?" asked David, as Richard made his way forward, closing the second curtain behind him.

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"I don't like it!" said Richard, pounding one massive but ineffectual fist into the other. He paced four huge steps forward, his hips avoiding the backs of the console chairs like a full-back avoiding one linebacker after another. His fourth step landed solidly on the floor next to the flight deck; he pivoted and turned to march back again.

"Lesson time again," piped a small blue cloud as it scurried up to a deep yellow rock with a cloud of amber water hanging softly around it.

@Certainly, Dainty"Blue"Warble,@ murmured the edges of the yellow cloud. @Just let me ingest my latest thinking.@

The small blue cloud waited patiently, only flickering a tendril or two while the large dark-yellow rock dissolved on the ocean bottom. The dark yellow dispersed in thin threads into the light yellow cloud above it. Soon you could not tell the difference between the threads and the cloud, and the rock was gone.

"What were you thinking about?"

@The fourth infinity.@

"Tell me about it!"

@Well . . . I will some day. But first you have to learn about the second infinity.@

"Tell me! Tell me!"

A yellow tendril poked a hole in the muddy bottom.

@Feel, youngling. There is a point.@

A delicate blue tendril felt into the murky bottom.

"That is a hole in the mud, older Warm@Amber@Resonance."

There was a long pause as the yellow cloud rippled in annoyance. However, the tone that resumed after the pause had all the warm patience that it had contained previously.

@Imagine it is a point, with no dimensions.@

"Yes, older."

The yellow tendril touched the surface of the soft mud again, leaving another tiny spot in the smooth surface close to the first one.

@Here is another point.

@Here is-another.

@Here is another.@

The line of close-spaced spots grew.

@Imagine.

@Imagine points so close they make a line. Infinitely long.@

There was a pause as the young blue alien absorbed the sounds. Its blue cloud enveloped the motions of the yellow wisp making a long string of tiny dots in the ocean bottom.

"Infinite in both directions, older Warm@Amber@Resonance?"

@Yes. Very good, youngling.

@Now . . . imagine a point not on the line.

@Here is one.

@Here is another.@

Soon a number of isolated spots were scattered above and below the dotted line on the muddy sea floor.

@Imagine an infinite number of them.@

There was a slight pause.

@Are there more points *off* the line than *on* the line?@

The youngling thought carefully before answering, its wisps of azure clumping and dissolving randomly. The older waited patiently. Finally the youngling answered.

"No! They are the same."

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@Right!@

"That was too easy. Give me a harder one."

@All right. Draw a line through any of those points I made.@

The blue cloud formed a tendril of its own and made a streak through one of the isolated spots in the mud.

@Draw another through the same point. Make it wiggly if you want to.@

A wiggly line joined the streak.

@Draw more.@

Dainty "Blue "Warble concentrated and soon dozens of distinctly different lines were drawn through the same point. Then came the question.

@Imagine you did that to each point. Are there more wiggly lines than points?@

The blue cloud stopped moving as it started to think.

Warm@Amber@Resonance drifted off on the current as Dainty "Blue "Warble pondered the last question. The fluid body of the youngling slowly began condensing into a bright-blue rock as the difficulty of the tough logical question called for more and more concentrated neural matter.

@Huunnm!@ murmured the amber older. @That will keep the blue menace quiet for a while. Off to the waves! MMMMM!!!!@

Warm@Amber@Resonance vibrated through the cooling seas, leaving behind a tenuous blue cloud condensing into a thinking azure stone—clear as crystalline sapphire.

Two day cycles later Gretchen was standing her shift. She wasn't allowed to do anything strenuous, but she took Arielle's place as pilot of the lumbering *Dragonfly*, while Arielle tried to take Gretchen's place as chief engineer. Arielle did a respectable job. She equalled Gretchen's performance in outship repairs and bettered her performance at the galley table.

"I don't see where she puts it," said Gretchen to David. "If I ate that much I would be as fat as Richard!"

"I heard that!" said Richard. "How much do you weigh, Shorty?"

"Eighty-five kilos, fat man . . . and you?"

"One hundred kilos—but I'm taller than you."

"The last five centimeters must be all fat," said Gretchen, sticking her tongue out at him.

Richard was glad. The brat must be okay if she could fight back like that. He was about to make some comment about squaws when Jill interrupted.

"White Whistler is returning."

"Ask why I was left!" demanded Gretchen.

"Just a second," said Jill, almost impatiently. "White Whistler is saying something important to the other flouwen!"

`I have solved the motion of the lights in the sky!`

Even the big circle?

`All the lights except big circle. It is a swimmer of the light. It is like us. Its motions are not that of logic.`

@But you can know the motions of all the rest? You can know the risings of Hot and the fadings of Warm and the tenacity of Sky:Rock?@

`All,` said White Whistler with confidence.

How can you be sure?

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`The humans gave me the rule for simple spherical masses. The rule was very simple. Yet it seemed complex when the rule was used on more than two spheres. After some thinking, I found the simple rule for many spheres.`

@Was it difficult?@

`No. A simple variable substitution combined with an interesting coordinate transformation.`

@Let me taste.@

Me too!

~Me too!!!~

The white cloud sent out a tendril. The end was whitely concentrated with nerve tissue. The other three aliens crowded around to taste the essence of Clear`White`Whistle's thought.

@Subtle!@

Tricky!!!

~I don't understand the taste!~ said the little blue one.

@You will. Just savor the taste and recall it some 1000 seasons from now. It will be much clearer then when you can handle such complexities.@

~But I want to know now!~

@Later, Dainty~Blue~Warble, later,@ said Warm@Amber@Resonance. Its yellow body expanded and contracted as it impressed on its memory the secret for the solution of the n-body central force problem. Warm@Amber@Resonance reveled in the cleanness of it. One complex variable substitution, and then that simple, yet unobvious, coordinate transformation! An nth-root dimension, indeed!

During the next day, a vibration began in the left wing. Gretchen's ears pricked up and she reached to turn off the fans just as Jill shut them down. The *Dragonfly* coasted to a stop, the lapping of the waves on the hull making the absence of the engine sounds even more ominous.

"The mounting bracket for the replacement fan is vibrating," said Jill.

"I'll go out and fix it," said Gretchen. "Probably just a bolt coming loose."

"You are still weak," said Jill. "I will wake up Richard."

"No!" exploded Gretchen. "I can do anything that big ox can do. I'm going out! I'm tired of being cooped up in this tin can." She stormed down the corridor, bumping into every console chair along the way. David, twisted partially away from his console by Gretchen's passage, gave a sigh, swiveled back, closed down his console, and went back to suit up with Gretchen. He would probably be only a tool holder, but the sooner he got her back inside the better.

Together they cycled through the lock and swam out under the left wing. Gretchen jiggled the bracing structure for the jury-rigged fan and found the loose bolt. She tightened it, and for good measure started to check the tightness of the rest. David pulled out his omni-wrench and backed her up by holding onto the other side of each bolt.

Suddenly they were engulfed in an encompassing cloud of good will. The purple cloud was back.

"What's that!" said David in alarm.

"Take it easy," said Gretchen. "That's just an old alien we call Deep Purple. Last time I saw him he was rocked up and trying to prove Fermat's Conjecture." She suddenly realized the importance of what she was saying; if not to their present problems, to the

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cadre of mathematicians six light years away on earth.

"Welcome, Deep Purple," she said. "Did you solve the problem?"

+Easy,+ the lavender cloud responded. +Human named Fermat right.+ There was a polite pause, then it continued, +DUMB problem!+

This was the cue for Loud Red. *I told you! DUMB problem!! DUMB!!!*

David broke through over Gretchen's imp. "Do you mean to say they have solved Fermat's Conjecture? How did they do it? We have only proved it up to something like n equals 1,023,467."

The sharp sonar senses of the huge purple alien caught the careful reeling of numbers. It paused in its exodus, then came back to surround Gretchen, as if it were really looking at a human for the first time.

+You solve problems with numbers?!?+ it asked, its incredulity rippling through its surface.

"Yes," said Gretchen bravely, "we do quite often. If it works for many numbers then it is probably true."

There was a long pause as the alien brain tried to absorb the alien thought. It rejected it.

+There are many numbers. There are . . . too many numbers.+ Deep Purple was struggling to express the idea of an infinity of numbers. Gretchen helped.

"No end to numbers," she said.

+No end!+ Deep Purple rasped in relief. +No end, so no certainty. Not use numbers.+

"But how . . ." Gretchen's eyes flitted from purple alien mounds to David's face.

"I think Deep Purple just proved Fermat's Conjecture for ANY number," said David. "Too bad we aren't smart enough to understand how it did it. We may think we're intelligent, but that alien equivalent of an aging surfer has us all beat."

While they were talking, the larger cloud had wrapped a purple tendril about two others, one red and one milky white. The contact had lasted for less than two seconds.

`Obvious,` said the white one.

. . . and DUMB!!! said the red one.

Let's do something else! Like SURF!!

+WAVE!!!+ said Deep Purple, leading the group to the surface as they dropped their preoccupation with mathematics and enjoyed the caress of the waves on their fluid surfaces.

`Wave!!!` keened the voice of Clear`White`Whistle.

DUMB!!!

FLOATING

After only six hours' sleep, George found himself awake again. He turned over in the dark space lit by the soft, flickering colored lights of his personal imp and tried to go back to sleep again, but it didn't work. His mind started to go over the problems that had to be solved if he was to get his tiny command off this ball of water. He tried thinking about Red, then Jinjur, so many megameters away, but his brain rejected those diversions and continued to worry. George gave up, slammed the Sound-Bar door open, and rolled out of bed.

"Another sign of getting old," he

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grumbled to himself. "Can't even get a good eight hours anymore."

He stumbled sleepily through his wake-up routine and went forward to the galley. David was there, plowing through one of his special dinners, a pseudo-knackwurst sitting on a bed of sauerkraut, a heaping mound of real mashed potatoes, green bean salad, and a pint of dark beer.

"Looks good," said George enviously as he punched himself up a breakfast of algae-omelet with pseudo-ham, algae-toast with pseudo-butter, and ersatz-coffee with pseudo-cream.

"My last special," said David, handing him a crisp green bean, which George took gratefully. "We've been making fairly good progress. Eight to ten kilometers an hour doesn't seem like much for an airplane, but if you keep it up hour after hour it adds up. We've traveled almost 1000 kilometers in the past five days and are starting up the water mountain. Only about 400 kilometers to go to the peak where Red can pick us off. If we can keep up the pace, we should be there in two days, three days before the periapsis passage."

George listened to the report thoughtfully, taking little bites of the green bean. His breakfast was pushed out onto the counter top by the galley imp. George thoughtfully nibbled the green bean, tasting each little bite. Then he started shoveling down the pseudo-breakfast as if he were refueling a machine.

"How's the weather?" he asked, pausing between drinks of coffee.

"It's getting worse," said David. "Each six-hour day-night cycle seems to generate a new storm in the hot crescent. The storm then spins its way into the cold crescent to dump its load of supersaturated ammonia. Most of the storms seem to head up the mountain, pushing huge ring-waves ahead of them. There was a real doozy that passed over a few hours ago."

"I know," said George. "The thunder woke me up and I just managed to get myself asleep again before I got seasick. I'm worried about the storms, though. That could make the pickup tricky."

"It's concerning Red, too. There are calm periods between storm fronts, but they're getting shorter and shorter."

"We'd better get a move on, then," said George. He pushed his empty tray back to the galley imp and went forward to relieve Arielle. David returned to his knackwurst, carved off a large slab, smothered it in sauerkraut, piled a dab of hot mustard on top, and put it into his smiling mouth.

"How's *Dragonfly* doing?" George asked, as he reached the cockpit area. Arielle turned around and gave him a crooked smile, the Neuskin patch distorting her mouth. Flashes of colored lights could be seen from between her lips, where the brace-imp still held her tooth in place.

That could start a whole new fad, thought George, looking at the literally sparkling smile. *Wait until the GNASA medics release Arielle's picture to the press.*

"We haf been making 16 kilometer, but the tide is turn the other way and we will now slow down," said Arielle.

"Can we put down an anchor?"

Jill answered for Arielle. "The ocean bottom is now 2.3 kilometers down. My

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sounding cable is long enough, but we really don't have anything that would act like an anchor to dig in the bottom instead of just sliding along."

"Are any of the flouwen around?" asked George. "Perhaps they would be willing to take the cable down to the bottom and tie it to something during the reverse tides."

"Loud Red is nearby," said Jill. "I will talk to it." There was a complex sound from the sonar dome at the front of the plane and soon a large red blob streaked by on the right side, circled the plane, and came to a halt in front of the slowly chugging ship.

Hi! You call Loud Red!?!

"Yes. We must move east to point under Sky:Rock. Water moves west so we move west. Look under me. See thick string?" Jill paid out a few meters of cable, and Loud Red dove under the ship. There were a few strong tugs that had George reaching for a handhold as they shook the ship.

"It certainly has no trouble grabbing hold of it," George said.

The red blob appeared once again in the view of the half-submerged cockpit windows.

"Bottom of ocean does not move," said Jill. "If thick string attached to bottom, then Floating:Rock not move. You attach thick string to bottom for me?"

*That dumb! Floating:Rock want to move east. If Floating:Rock attached to bottom Floating:Rock not move east. Not move at all! Dumb! If Floating:Rock want to move east, *I* move Floating:Rock east!*

Loud Red dove again beneath the ship and shortly reappeared, swimming strongly forward. There was a jerk as the cable tightened, and soon they were under tow. After a few minutes Jill gave a report.

"We are moving five kilometers an hour east in a current that is running twelve kilometers an hour west. Loud Red has almost doubled our speed through the water."

"I wonder how long it can keep it up?" mused George. Three hours later, sitting with Arielle in the cockpit, he became more and more impressed by the alien's performance. Not that it was easy for Loud Red, as he let them know frequently.

Hard work! Tired! Hungry! Go get something to eat! Abruptly the *Dragonfly* slowed in the water until it reached the speed that its fans could maintain. It was dark, and Loud Red slipped quickly out of the landing light beams.

George wondered if the flighty alien would return. It could well be that after catching and eating something, it would go off surfing and forget all about the humans. But he was wrong. Loud Red returned in a half-hour, fighting with his pack of hunters over the remains of a large blue-green Pretty:Smell. The alien finally threw the remainder of the carcass to the pets, who went off with it. Jill called to Loud Red to resume pulling.

No!

"But we must get up the mountain!"

No! Wrong time! Wrong way! Wave . . . Ocean . . . Sky:Rock . . . frustrated, Loud Red left at high speed. *Wrong way! I get White Whistler!* it said in parting.

"It sounded like Loud Red was trying

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to explain something, but didn't have the words," said George.

"I could have worked out a joint understanding," said Jill. "But perhaps White Whistler would be less impetuous and easier to work with."

Roaring*Hot*Vermillion streaked through the murky depths at top speed, sonar signals making the ocean bright with sound. Far off in the distance were voices. A slight change in course and the red cloud began to converge on the sounds.

`I hear Roaring*Hot*Vermillion approach.`

"I can hear him too!"

@Very good discrimination, Dainty"Blue"Warble. What else do you hear?@ The small pale blue cloud paused and the two olders, Clear `White`Whistle and Warm@Amber@Resonance, stopped moving to reduce the local noise clutter.

"One . . . two . . . three . . . smaller sounds. They are the Orange:Hunters of older Roaring*Hot*Vermillion."

@Excellent hearing, young one,@ said Warm@Amber@Resonance.

`Yes,` said Clear`White`Whistle. `Now try seeing yourself and let us know when you detect them.`

Sharp bursts of directed sound piped from the little blue cloud as it attempted to see off into the distance. The two olders added their own occasional bursts at a lower pitch.

Roaring*Hot*Vermillion heard them seeing him and started talking as the distance closed.

The Floating:Rock is going to the inner point.

`That is dangerous. It is getting near the time when one should stay away from the inner point.`

I tried to tell it. But I don't know the words! You must tell it to stop!

`It will take some time to teach Floating:Rock the words, but I will try.`

@Do we dare go close to the inner point when the time is so near?@

`I have watched a number of near times from the side of the mountain. There are still ten days left. We can find Floating:Rock, warn it, and get back to a safe place in that time.`

@Did you say these human creatures can look at a distance?@

`Yes. They have disks in their top lump like the ones that I make for looking.`

@Then I will come also. I have an idea for communicating the danger to the humans that does not involve teaching them new words.@

`Then come along and tell me as we go.`

"I want to go too!"

@Dainty"Blue"Warble, dear. It is too dangerous for little ones.@

"I'm not little. I'm almost as big as you are. Besides, older Clear `White`Whistle said there was plenty of time, and I swim fast."

@But, dear . . .@

`Let the little one come. It will be good experience, and there is really no danger provided we start back on time.`

The three colored clouds swam off to join the approaching red cloud, which slowed and turned back the way it had come. Soon the four members of the pod swam as a group back toward the inner point.

It was daybreak and everyone was

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awake to enjoy the next hour and a half of sunshine. The seas of Eau were relatively calm since Barnard had begun heating up the back side of Roche rather than evaporating the ammonia out of the seas, and the atmosphere over Eau had had time to calm down. The high clouds that had been raining huge, slow-falling drops of ammonia on the inner pole were being parted by the warm dry breezes from Roche flowing through the narrow neck between the two planets. Through the hole in the clouds Barnard rose majestically over the mountains of Roche, its beams shooting down the long rift valleys that deepened as they furrowed their way to the oval peak of the rocky globe.

Jill had been chugging her way toward the inner pole of Eau, trying to get as close to the gravity minimum as possible in order to make it easier for the ascent module to pick them off.

"How are we doing, Jill?" asked George.

"We have been inside the 95 percentile pickup contours for the last half hour. The high tide peaked not long ago, so the water mountain is dropping rapidly. We are starting to drift out again."

"We'll make it back again at high tide if we can just keep chugging. Can you raise Rocheworld Base?"

"Rocheworld Base, here," said Red, her voice penetrating through the haze of electronic noise generated by the multitude of storm cells wandering over the overheated water cone of Eau.

"We will be inside the pickup contours at the next high tide, three hours from now. It'll be dark here, but we'll have our lights on and you should have no trouble finding us."

"Right, George. I read you. Now let's see if Jack can read Jill." The humans kept silent as the two computers interchanged information.

"Communication complete," said Jill. "The Wolfe error-correction code never had to be activated. The personnel transfer should proceed without any significant problem."

George grinned. Soon his command would be out of this sodden hull of aluminum and back into space where they belonged. He gazed up at the bright orb of Barnard. At this point in Rocheworld's orbit the red dwarf star was four times larger than the Sun and looked even larger, since it was still close to the horizon. Despite its brightness, he had no trouble looking at it, for it was no brighter than a charcoal fire—a charcoal fire with dark red clouds floating over its surface.

He thought of his last charcoal fire — the time he and Jinjur had traveled out to Annapolis to exercise her alumni privileges. A small sailboat with a huge sail, and a night in a shoreside cabin. They had spent the evening tossing fuel into the hibachi on the patio and quietly getting drunk on white wine. Nothing had happened that night, for they knew they had the rest of their lives together.

"Hey!" yelled Gretchen from the rear, as the plane lurched upward. George turned in time to see the remains of an algae-shake spin lazily through the air and glop onto the ceiling. He felt a thump and another, then watched the algae-protein start to drip downward in the low gravity. The Christmas Branch rescued the situation by grabbing the metal container out of Gretchen's grasp

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and installing the shake back into the shaker before it hit the carpet.

"Loud Red has returned," said Jill. "Since I was heading up-mountain, they came at me from my blind side."

That was fun! Can I bump it again?

No! One bump is enough!

One bump is probably too many for the humans inside.

@I don't think you ought to be teaching Dainty Blue Warble your boisterous habits.@

I bump Floating:Rock again!?!

No!

Floating:Rock is still moving toward the inner pole.

I tell it to stop, but it does not.

It is dangerous here on the surface of the ocean. Let's get it down on the bottom where it is safer; then we can try to talk with it. Roaring*Hot* Vermillion! Come here! Attach yourself to the outer wing of Floating:Rock and sink yourself. You others! Do the same! Quickly!

Yes! Let's make this Floating:Rock sink!

"Loud Red has attached itself to my wing," said Jill. "It seems to be extruding the water from its body and is dragging the wing-tip under."

"Tell it to stop," said George. "We've got to maintain headway in this countertide if we are going to make the pickoff at next sunrise."

"They don't seem to be paying any attention to me," said Jill. "They are too busy talking among themselves . . . There is another one on the other wingtip. It's Yellow Hummer. Rocking up like the other one."

"What's going on!" said George in alarm. He looked out the cockpit window as an amber blob and a pale-blue blob climbed up on the wing and proceeded to shower ammonia water from their cells.

"White Whistler has my tail," said Jill. "They are pulling us under!"

DIVING

They sank beneath the waves, the red light from Barnard turning purple-green under the ammonia oceans.

"Jill!" cried Gretchen. Her ears caught a strange noise, and her nose wrinkled. "What's going on? Is the hull leaking?"

"As we submerge, I'm balancing the water pressure by increasing the internal pressure," said Jill. "You've been under 0.2 atmospheres of almost pure oxygen. With the water pressure rising, I've had to put back some of the nitrogen to keep the flame-point down."

"I thought I smelled something different," said Gretchen. "Can the hull take the pressure? It wasn't designed to be stressed in this direction."

"The pressure hull in *Dragonfly* is pretty rugged, since the designers didn't know what it would run into. In compression it should hold against 20 atmospheres. Don't worry. We should be safe even if we go all the way to the bottom."

There were some gasps from Arielle and David.

"It's snowing!" said David.

"Blue fnow!" said Arielle.

George turned and looked out the cockpit windows. Shining brightly in the landing lights was a cloud of large

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blue needles which drifted downward with them as they sank.

"What makes the snow blue?" asked Gretchen. "And how can it snow underwater?"

"The top layers of the ocean here at the inner pole are mostly ammonia from the ammonia rain on the surface," said Jill. "As we get deeper, the ammonia concentration decreases, but it gets rapidly colder. Right now the ammonia concentration is 60 percent, while the temperature has dropped to −85 centigrade. That is cold enough to form ice made of two parts ammonia to one part water. The blue needles must be nucleating out of the supercooled liquid. They are falling because the solid is denser than the liquid."

For a few minutes everyone watched the fascinating scene. The blue snowstorm became thicker and thicker until their landing lights penetrated only a few meters into the swirling cloud.

"Are the flouwen being affected by the cold or the snow?" asked George.

"They are still talking among themselves much as they were at the surface. I don't think they are particularly surprised or affected by the snow or the temperature variation. The temperature has stopped dropping. We're now at −92 C, and it's starting to go up again. There is also a drastic change in composition. We seem to have entered a warm current headed toward the inner pole. It is denser since it is half-water and half-ammonia."

"What waf that?" said Arielle, her quick eye spotting something unusual in the scene outside the window. "There'f another one!"

"White snow!" said Gretchen. "And this time it's going up! It's snowing in both directions! Blue snow falling down and white snow falling up!"

"That white snow must be a solid that is half-ammonia and half-water," said Jill. "None of my records indicate its density, but the solid must be lighter than the liquid, like normal ice, so it is rising to the surface."

The blue blizzard started to decrease, first in the size of the needles as they began to dissolve in the cold water-rich mixture. Then the individual particles began to disappear while the fall weakened in intensity. At the same time, the intensity of the upward-falling white snow began to increase. The particles were very large, like summer hailstones.

"Listen!" said Gretchen, then got down and put her ear on the deck. The rest of the crew stopped talking, and a hush settled over the cockpit. They could hear the pitter-patter of ice-balls striking the bottom of the plane and wings as they rose past the sinking plane.

They finally passed through the white-ice storm, which tapered off to little white specks that seemed to appear out of nowhere in the frigid water.

"We're moving into the middle of the warm water current," said Jill. "It's now too warm for the ice to form."

"And how warm is that?" asked George.

"Minus 78 centigrade."

"Balmy," said George. The show over, he left the window and went back to the galley for a quick bite.

For the next half hour they continued their plunge. The air in the cabin be-

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came oppressive as Jill slowly boosted the internal pressure to 10 atmospheres.

"I feel like I'm swimming," griped Gretchen as she passed by George to check out the hull in the rear. There were occasional mysterious creaks and groans as the walls took up the increasing external pressure.

"We've reached the middle of the warm stream," said Jill. "Maximum temperature nearly −50 C—warmer than the surface. It's starting to drop again. Water concentration now 60 percent, compared to 40 percent ammonia."

"Is it going to continue that trend until the bottom, or are we in for another surprise?" asked George.

"Yes."

"Yes, what?"

"It's going to continue the trend, and we are in for another surprise if it does."

"What's the surprise?" asked George. "Anything dangerous?" Before Jill could answer there was a cry from the cockpit.

"MORE fnow!"

George went forward to look. This time the snow took the form of transparent, faceted balls. They were tiny at first, but as they fell they turned to marble size. Although transparent, they weren't too hard to see, since they glittered rainbow colors in the intense beams of the landing lights, which scattered the light around their internal facets and out again.

"Beautiful!" cried Arielle, exhilarated over the colorful scene. "What if it?"

"That's ordinary ice," said Jill. "Pure water crystals settling out of the 25 percent ammonia solution to fall to the bottom. The faceted balls must be a compromise between snowflakes and hailstones."

"I thought ice floated," said Gretchen.

"It floats in water, but this ocean is a mixture of water and much lighter ammonia," said Jill. "At concentrations of greater than 23 percent ammonia, pure ice is heavier than the ocean water."

"Then the bottom must be covered with snow," said Gretchen.

"It is," said Jill. "I can detect it on my sonar. We're not too far from the bottom. We should start seeing it soon."

Working the fan motors in opposite directions, Arielle pivoted the plane in a slow circle. The faceted ice spheres became nearly invisible and slowed their rate of fall as they entered the water-rich layers of ocean near the bottom. The ice balls still refracted the light slightly, so it was like looking through a poorly made window pane. The landing lights from the twirling, falling plane picked out a white reflection in the distance.

"There'f fomthing!" said Arielle. She expertly reversed the fan controls and brought the plane back around so that the searchlights illuminated the pointed white object. As the plane continued down, the point slipped upward into darkness and the light beams illuminated the steep slopes of a white mountain.

"It looks like the Alps!" said Gretchen. "It's an underwater glacier!"

As they continued their fall, the distant slopes flattened out and began to approach them in the light beams. Arielle turned the landing lights downward and saw the surface below rising rapidly to meet them.

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"Get ready for landing!" she said and, increasing the fan power to provide maximum lift, she attempted to slow their rate of descent. The surface rose beneath them and there was a jar as the nose of the plane buried itself in the slushy surface, followed by a thump from the rear as the tail hit. They had landed on the ten-degree slope of the glacier, facing up-mountain.

"Is the hull tight?" Gretchen asked her imp. She was worried. Even a tiny leak of that poisonous water and they would have to get into suits until it was fixed and the air cleared.

"The hull is fine," Jill reassured her. "I think I can even back off on the internal pressure a little. I'll do it slowly so your ears won't pop."

Gretchen went down to the back to check out the equipment lockers, to make sure nothing had been jarred loose by their rough landing. George went forward to the control deck and got in the co-pilot seat. The aliens had insisted on taking them down here; now it was his job to get them back up and out into space where they belonged. He looked out the cockpit window and paused as a sense of déjà vu came over him.

"It's just like the Moteratsch glacier near Pontresina in the Swiss Alps! If only I had brought my skis," said George. "But the only thing I'm sure of is that it's not the Alps. Where are we, Jill?"

A map showed up on his display. From the shading and angle, it was obviously a sonar map that Jill had taken on the way down. At the top of the screen was a large circular depression. Running out from the circle were dark ridges of stone, and between the ridges were rivers of ice. A small blinking dot showed their position partway down one of the glaciers.

"We're on the side of an underwater volcano," said George. "It's a big one, like those on the real Hawaiian Islands. If the water weren't so deep here, they would be sticking up in the air for a few kilometers. Fortunately this one doesn't seem to be active, since the crater is filled with snow." He looked at Arielle and raised his right eyebrow, asking for permission to touch the controls. She nodded, and he moved the landing lights back and forth, trying to pick up their local terrain.

"I've got the aliens on the infrared scanner," said Gretchen from the science scan instrument console. "They're still rocked up, holding us down, but the two on the left wing seem to be talking."

"Can you understand them, Jill?" asked George.

"I can pick up some of it," said Jill. "It is something about getting us out of danger. I still don't understand why they dragged us to the bottom, but I think they think they're doing us a favor."

"Do you get any inkling of what they're going to do next?"

"They are talking about bringing something big, but I don't know what it is."

It's cold! And boring! murmured a small tab of flesh attached to a large red rock sitting on the wing.

`Then we'll stay here holding Floatng:Rock down while you go break off a big chunk of ice and bring it back.`

But that's hard work!

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@I'll go and get it then. You stay here rocked up.@

`Can I go too!`

`Not this time. Just one can go. The rest must stay rocked up until we get enough ice rocks to replace us.`

I'll go! The large red rock rapidly dissolved and expanded into a huge red cloud. It swam rapidly off toward the foot of the glacier, mumbling as it went.

Cold! Tired! Boring! Rather be surfing!

Soon it returned, pushing a flat plate of ice some ten meters long, five meters wide, and a meter thick. Jill caught a glimpse of it as it settled on the wing.

"They are loading up the wing with blocks of ice," said Jill.

"They really mean to make us stay on the bottom," said George. "Can't you tell them to stop?"

"They are deliberately ignoring me," said Jill. "We'll just have to wait until they are ready to talk."

"Should I get Arielle to try to shake the ice block off by rocking the fans?" asked George. "It can't be too heavy, despite its size. It is only a little denser than the ocean water, and the gravity is low here."

"No," said Jill. "They must have some good reason for what they are doing. Let's wait and find out what it is."

That's two. Hard work!

`Soften up again, Warm@Amber@Resonance, and help Roaring*Hot*Vermillion bring more ice rocks.`

Working together, the yellow and red clouds soon had the top of the wing covered with large chunks of ice, and the remainder of the flouwen relaxed their hold on the *Magic Dragonfly*. They tried to place similar chunks on the tail fins, but the heat exchangers in the tail surfaces melted them off. More blocks were added to the wing and placed on top of the fuselage, where the inside heat escaping from the hull soon melted a groove in the underside of the blocks. The flouwen discovered that the blocks now easily balanced on top.

`There! That should make them safe enough.`

@The time is getting close. We should go!@

`First I must tell Floating:Rock and the humans about the dangerous time. But there are so many words that it doesn't know. It will take time.`

@Since the humans can't see with sound, but can look with light, perhaps we can tell them faster with a body play rather than words. It would have to be a very simple body play, since they can't see inside the players as we do, but they could get the idea from looking at our outsides.@

`Good idea. You are the best body player. What shall we do?`

@Humans think in terms of colors rather than textures. You be the icy-white solid part of our world, and Dainty~Blue~Warble can be the ocean covering our world. Roaring*Hot* Vermillion can be Hot. That's an easy part for you, just sitting there being a red globe.@

Dumb part!

`You could make it more realistic by spinning around and having soft cloudy-like bumps on your surface.`

Hot has clouds?

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`Yes. I have seen them with my seeing disk.`

Like this? The red cloud turned into a rapidly spinning red sphere with bumps on it. The formless white cloud scanned the result with a few bursts of sharp sound.

`Slower. Make the bumps smaller. Good.`

@Not good. Hot should be spinning over there in front of Floating:Rock so that the humans can see.@ A focused burst of sound rebounded from a point on the glacier some five meters in front of *Dragonfly*'s nose. The spinning red sphere drifted slowly over to the indicated point and hovered a few meters above the snowy surface, the shallow bulges on the spinning surface shining redly in the landing lights.

The stage for the body play was set. Clear`White`Whistle went over to Floating:Rock and started to talk to the strange metal being. A peek through a disk lens confirmed that the humans were seeing their play from the clear places in Floating:Rock.

`Top of ocean not good,` said White Whistler. `Time soon when sky . . . eat . . . top of ocean.`

"It wanted to use another word," said Jill. "But we don't have it in our joint vocabulary."

`Good place is hot side of world. Inside islands. We swim there soon. You cannot swim fast. You must stay here. Here is not good, but here is not bad. You not be . . . eaten. Eaten not right word. We show you. Loud Red is Barnard, Yellow Hummer is Sky:Rock, I am world, and Little Blue is ocean.`

"It'f a play!" said Arielle, delighted.

Gretchen reached up to the cockpit ceiling and swung down a video camera that peered over George's right shoulder. With the two scanners on the side and the ceiling camera, they would have a complete record of the performance. The snow had let up a little, so the visibility was excellent. As White Whistler swam off to join the others, Jill could hear Yellow Hummer giving detailed instructions to Little Blue. George looked at the output of the video camera on his display and zoomed in on White Whistler and Yellow Hummer turning into the egg-shaped forms of Eau and Roche. Little Blue flowed around White Whistler, the blue color completely covering the larger white body except for some spots on the outer pole. Twirling smoothly, the miniature version of Rocheworld started its elliptical orbit and moved closer to the deep red spinning sphere of Barnard.

"It's an amazingly faithful reproduction of Rocheworld in orbit about Barnard," said George. "But I don't see what they're up to. How could orbital dynamics be any danger to us?"

"I don't know," said Jill. "But so far all they are doing is repeating the portion of the orbit that we have already experienced. I suspect whatever is bothering them occurs at or near periapsis, since it is only nine hours away."

"Could it be storms?" asked George.

"I doubt it," said Jill. "The heating from Barnard wouldn't change that much in the last few hours."

"What is it, then?" said George.

Arielle turned and put her finger to her patched lip.

"Huf! I'm watching the play!"

George hushed and watched the play.

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Am I pretty?

"Wheee! This is fun! Do I get to bloop over now?"

@Not till I tell you.@

"Besides, an ocean isn't supposed to talk. A Hot either, even if it is pretty."

Hummm. Twirl.

@No humming either.@

The blue and yellow eggs spun around each other as they moved between the red globe and Floating:Rock. The blue ocean began to slosh back and forth.

"Do I go bloop now?"

@Not this turn, but next one. Now!@

"Bloop! This is fun!"

@Now back. That's right. Now bloop again.@

"Bloop!"

@One more time and that's all.@

"Just once more? That was fun bouncing into you."

@No. World only bloops three times and we want the play to be a correct one.@

"It's time again. Bloop!"

"My God!" said David. "The whole ocean is transferring from Eau to Roche."

"Not the whole ocean," said George. "But anyone on the surface near the inner pole during periapsis would find themselves under an eighty-kilometer interplanetary waterfall with millions of tons of water falling on them."

"I don't see how that could be," said Richard. "I remember calculating the relative orbital displacements of Roche and Eau with Thomas, when we were arguing whether the Rocheworld orbit was stable or not. The most the Barnard tides can do is to move the two lobes some three kilometers closer. That's nothing compared to the eighty-kilometer spacing."

Jill had been silent for some time, but now it spoke. "You forget the saddle shape of the gravity potentials at the center point. A change of only three kilometers in separation causes a large shift in the potential surfaces that connect the two lobes. Sea level on Eau is usually forty kilometers below the zero-gravity point, but with the two lobes closer together, the zero-gravity point moves within kilometers of the surface of the water. We also forgot to consider tidal inertia. When the two lobes are equally illuminated, the planets are pulled apart by twelve kilometers and the top of the ocean mountain drops fifty kilometers or so, then rushes back in the next three hours as the lobes line up with Barnard and the tides are at maximum. That large water shift is going from a wide to a narrow region and should build up into a spectacular tidal bore. I can't figure it out exactly because of the conical geometry and the changing gravity field, but it wouldn't surprise me if the bore wave didn't become many kilometers high and travel at tsunami speeds. There would be enough inertia to throw the whole top of the water mountain through the zero gravity region onto Roche."

"How far did the wave go on Roche in the simulation play?" asked George. "It reached the site of Rocheworld Base, didn't it!"

"Yes," said Gretchen. "We must warn them!"

"How?" said Jill, ever logical. "My radio, radar, and laser are all worthless this far under water, and my sonar won't

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propagate through space to the comsats.''

''There's got to be a way,'' said George. He looked up to see that the alien play had finished. Arielle was giving tiny pitty-pats of applause. White Whistler flowed up and halted in front of the sonar dome.

`Do you understand?`

''Yes,'' replied Jill. She guessed at the meaning of an alien whistle that she had correlated with the motions of Little Blue. ''When Eau and Roche are near Barnard, the ocean will 'bloop' over.''

`Yes! Bloop can eat . . . Can make you a set of number zero.`

''I guess that's the closest they come to a word for death,'' said George.

`Bloop come soon,` said White Whistler. `We go now. You stay here.`

White Whistler streaked off up the glacier at high speed with the rest of the colorful group following.

''Call them back!'' cried George. ''We've got to get those ice blocks off and get up to the surface to warn Red and Sam and Thomas!''

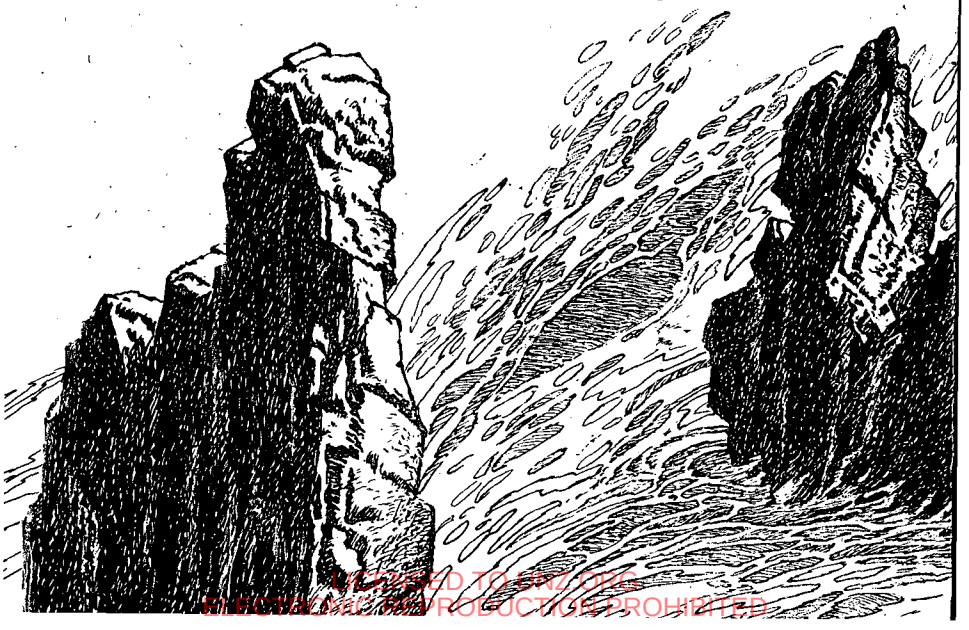
''They don't respond,'' said Jill. ''Besides, it would not be safe for you on the surface.''

''We've got to do *something!*'' George yelled.

''The best something we can do is wait,'' said Jill, the calm tone in its voice trying to soothe the emotional human. ''You have been up for thirty hours, George. . . .''

George took the hint and tottered down the aisle to his bunk, muttering to himself as he went.

For a long time Arielle and Richard stared out the cockpit window at the scintillating glitter of the faceted trans-



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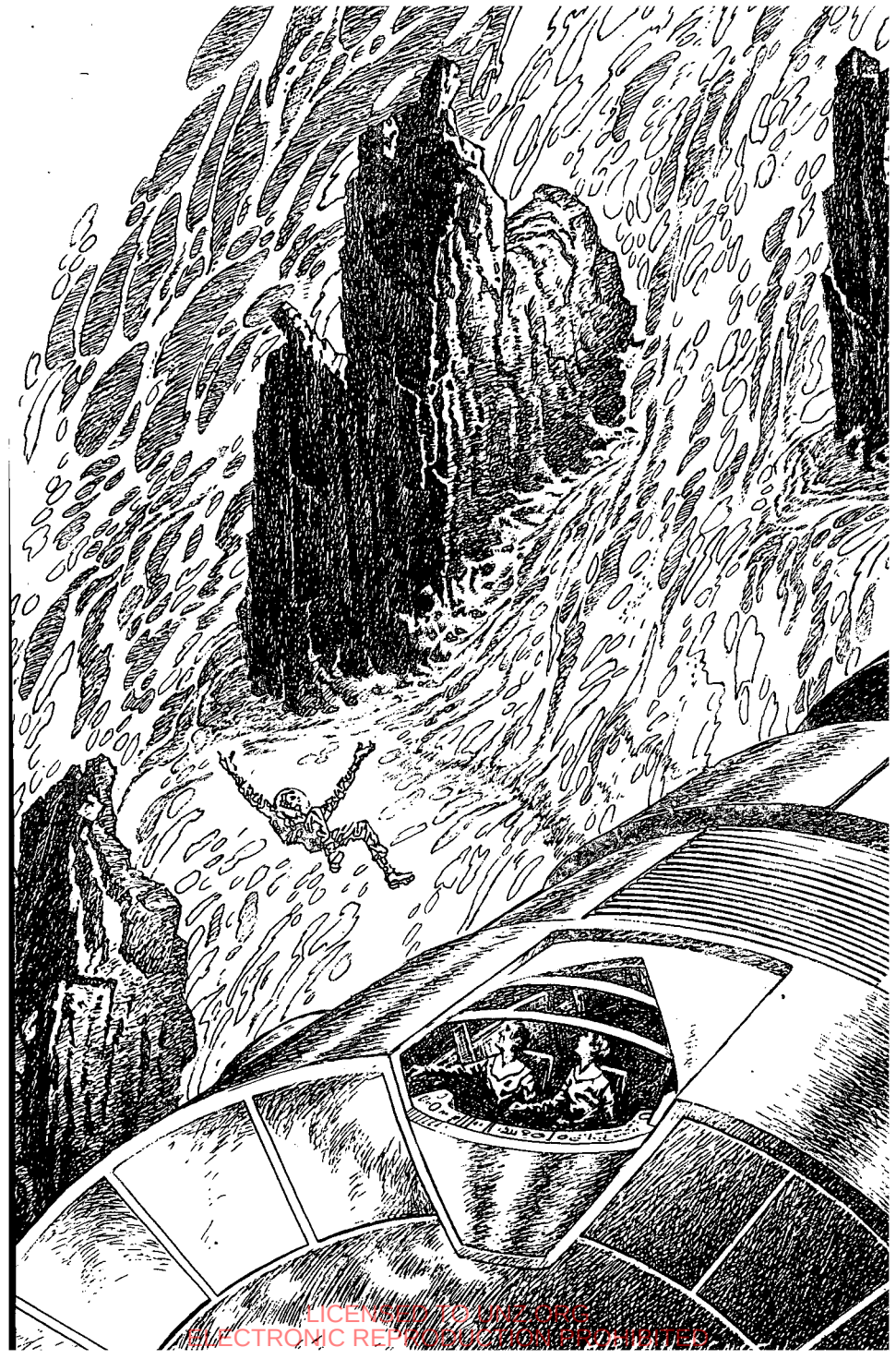

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parent spheres falling down on the white surface. The ammonia-water between the spheres would soon freeze into a slushy ice full of ammonia bubbles that gave the glacier its blue-white tone.

Richard got busy at the science console. He found that the sonar could penetrate the layers of ice beneath them and map the underlying rock strata. It took Jill over one hundred pulses to build up a high-quality image through the scattering layers of ice. There was nothing else to do, so Jill concentrated on giving the human the best data it could gather.

"Is that a lava flow?" asked Richard, scribing with his finger the telltale outlines of a frozen stream of hardened rock.

"Let me check for continuity," said Jill, bouncing pulse after pulse at the smooth edge. Then Jill noticed something else . . . a blurred infrared image on the surface of the glacier above, that matched the rock flow below.

"The volcano may not be as dormant as we first suspected. There is an infrared contour at the 0.01 C-level on the surface of the glacier that follows the contour of the frozen rock flow below."

"Let's do a detailed scan of that region," said Richard. "Do you have time for one thousand pulses per scan element?"

"I have nothing more important to do," said Jill, and started off the first of one billion sonar pulses that it would emit in the next twenty minutes.

"Thomas? Come here for a minute and watch." Red Vengeance glanced down at her radar display, then out at the distant globe of Eau hanging in the sky.

"Eau is getting pretty active," she said, as he joined her. Thomas squinted a bit at the large red globe hanging over the dark mountain of water in the sky, then framed the scene between his two hands.

"It's a great shot," he said. "I think I'll go get my long-distance lens." With a bound he was across the bridge and swinging down the passway to the crew quarters. He was back in less than a minute.

Red heard an electronic whistle as the liquid crystal shutter activated, then a chitter as the microprocessor loaded the bits into a mass memory. It cost Electropix an extra few dollars to bridge a piezoelectric disk across the data bus so the customer would *know* that the picture was taken and stored, but it was little touches like that that kept Electropix at the top of the heap.

There was another chitter from the camera, then Thomas, still peering through the lens, made a questioning sound.

"What is it?" asked Red. She looked up at Eau, then saw for herself. Rising from the top of the water mountain was a huge fountain of water. Slowly it rose and rose and continued to rise, glowing redly in the sunrise light of Barnard.

"Wow!" said Thomas. Then all Red heard was the whistle-chitter, whistle-chitter of the electrocamera, cramming bits into its nearly inexhaustible memory.

"It looks like a volcanic eruption on Io," said Red. "It must be the tides from Barnard."

"You didn't see it up close like I did," said Thomas. "It didn't rise up

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from inside like a hot bubble; it just drew back and jumped!''

''That fountain must be ten kilometers high,'' said Red.

''It is twelve and a half kilometers,'' said Jack. ''That was its maximum. It is starting to fall now.''

''But it's getting so big!'' said Red.

''Yeah!'' said Thomas, his camera whistling into action again as the fountain spray spread out into a huge white oval.

''And it moves so slowly,'' said Red.

''That's because it's so big,'' said Thomas, finally putting aside his camera. The oval was getting splotchy and completely inadequate for artistic photography. Besides, he was sure Jack was taking very good scientific pictures of the eruption.

''It's developing a moustache,'' he said. ''Look, the moustache ends are starting to curl.''

''It looks like the top of a tornado,'' said Red.

''A tornado 200 kilometers high and still rising!'' said Thomas, reaching again for his electro-cam. ''Is it moving?''

''No,'' said Red. ''Its base seems to be fixed to the high density region between the inner poles. Thomas . . .''

''Yeah, Red?'' (whistle-chitter, whistle-chitter) Something bothering you?'' (whistle-chitter)

''We can't run the ascent module in that weather. Tell *Dragonfly* to wait until after periapsis.''

''What's the matter, Red? You chicken?'' said Thomas, instantly regretting the flip comment.

There was a dead silence.

''This chicken didn't live to be 38 in the asteroid belt by jetting off on stupid missions,'' Red said. ''Have Jack check the numbers if you want. With those winds, the ascent module has negative margin. Good night, Thomas.''

A green streak with a red head launched itself angrily across the bridge and down the passway, trailing slowly falling drops of water that settled to the cling-carpeted floor.

Thomas was left alone on the bridge. A short conversation with Jack confirmed that Red's intuition was correct. Conditions had changed enough that the crew on *Dragonfly* could not be rescued. The ascent module was designed for fighting gravity, not an Oz-sized tornado.

Thomas called up Sam from the galley below.

''I think you'd better try to raise *Dragonfly* through the comsats,'' he said. ''There's a change in plans.'' To comfort his personal agony over his mishandling of Red during a crucial situation, he nervously unholstered his camera and started taking more pictures. Later he would admit they were the worst he had ever taken. Sam finally broke through the preoccupation and the whistle-chitter.

''There is no contact with *Dragonfly*.''

''They're on the dark side of Eau,'' said Thomas. ''Did you work through Clete?''

''Clete is on the daylight side,'' said Sam. ''And neither Walter nor Barbara has had any contact with *Dragonfly* in over three hours.''

Thomas suddenly felt old.

Gretchen, whose sleep was as light

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as that of a nervous young mother with a newborn, opened her eyes in the darkness of her bunk, the blackness softened by the tiny flicker of lights from the crescent-shaped computer imp in her hair. Something had changed on *Dragonfly,* and her alarm system had wakened her. She lay listening to the subtle throbbings of a ship at work keeping five humans safe while submerged deep under a poisonous sea. There was nothing really wrong or Jill would have awakened her, but something had changed. She listened more intently. Then she suddenly realized what it was that was bothering her. She couldn't hear! She swallowed violently and her ears cleared.

"We've changed pressure, Jill," she said. "What's going on?"

"The tides are getting stronger," Jill said through her imp. "The water level above us dropped ten kilometers in the last hour, so I changed the internal pressure accordingly. There is no danger; go back to sleep."

"Are you sure that the decrease in pressure won't trigger anything, like a phase change in the ice that will cause the glacier to fissure and swallow us up?"

Jill paused a second as she ran the various possibilities through a detailed analysis.

"Positive," said Jill. "Go back to sleep."

As Gretchen closed her eyes and started the ten-second process of putting her brain back on idle, the tide above them reached its minimum. Deep within the bowels of the planet, a chamber of magma that had been kept bottled up by the overburden of water was finally able

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to push its way up to the surface, rumbling as it came.

"*Earthquake!*" shouted Gretchen, who was out in the aisle and halfway to the engineering console before she woke up. Another rumble threw her against the galley. Holding on to whatever she could grab and wishing that her bare feet had corridor boots on, she made her way forward through the rocking ship, strapped herself into the chair in front of the engineering console, and started to take Jill through a checkout.

"What'f going on?" said a sleepy Arielle, trying to keep upright by holding onto one of the stools in the galley. "If it earthquake?"

"I don't think so," said George from up front. "It's been going on too long and is getting stronger. I'm afraid that this volcano we're sitting on is about to erupt. I don't know what we can do about it, but you'd better get up here."

Arielle let go of the stool and started forward, but was thrown back into Richard's arms. The nearly naked young man, dressed only in shorts and corridor boots, took the bunny-suited pilot under one arm. Carrying her forward, he installed her in the cockpit. Once there, the alert pilot brain checked over her console and turned to George.

"I try to get free," she said. "If I make fan go with earthquake, maybe I get ufe off."

"It's worth a try," said George. "Go to it!" His eye caught something high above them in the unlit darkness at the peak of the mountain. "My god!" he cried, his voice choking with fear. He pointed up.

"It's red-hot lava!" shouted Gretchen. "It's coming down the mountain right at us!"

"It's got to eat through a lot of glacier before it gets to us," said Richard. "Can you get us loose, Arielle?"

Arielle, like every test pilot living, became even calmer and more deliberate in her motions as the danger grew.

"I think I try a yaw twift," she said, operating the fan levers in synchronism with the shaking of the ice beneath them. She kept it up for ten seconds, then stopped.

"Nope," she said. There was a second's pause in her motions while her brain moved at high speed through her other options.

"Now I try fome pitch," she said, and tried raising and lowering the nose of the plane with the fans in an attempt to buck the ice off. After another ten seconds she stopped.

"Nope."

A hushed silence fell over the crew, and David took advantage of a lull in the shaking to rush from his bunk to his computer console seat. Everyone was looking at Arielle.

"I've got the lava flow on the science scanner cameras," said Gretchen. "It's moving at a kilometer per minute through the glacier. Through the infrared imager you can see a wall of melted water flowing down just ahead of it and getting bigger as it comes."

George switched his console to the IR scanner display. A white-hot tongue of fire flowed down from the top of the mountain to the middle of the screen where it met the cool-blue ice of the glacier. At the intersection was a roiling mound of yellow with large blue chunks floating on the surface.

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"What are those blue chunks?" he asked.

"They look like blocks of ice," said Gretchen. "Yes, they must be. The glacier is pure water ice, which sinks in Eau's ocean because it's heavier than the 25% ammonia solution. The mound of yellow is ice melted by the lava and is nearly pure water. The glacier ice will float on water, so it's breaking up into blocks and rising to the surface of the water mound as the lava burrows under the glacier and weakens its hold on the rock."

"Those blocks are as big as office buildings!" said George. "Get us out of here, Arielle!"

"Let me fee now," said Arielle calmly. "Maybe a yaw twift with a pitch maneuver . . ." Tiny hands rapidly flickered over the controls, and *Dragonfly* bucked and twisted in an attempt to get free.

George stared at the IR scanner image and saw the yellow wall of warm water pouring down the slope at high speed. They had only a few minutes before it would be on them.

"Nope," said Arielle calmly. "Hummm . . . maybe . . ." and the plane lunged backward and stuck.

George looked up from the screen and gazed out the cockpit window. He turned the landing lights upward. He couldn't see the invisible wall of water sweeping down on them, but he could see, floating hundreds of meters above them, dozens of blue-white ice blocks hundreds of meters in size, tumbling through the turbulent water.

"Nope," said Arielle. "Maybe . . ."

"Brace yourselves," commanded George.

The *Magic Dragonfly* surged upward as the tongue of warm heavy water swept under its wings and lifted it up.

"The ice blocks are floating off the wings!" shouted Gretchen.

George noticed that he was no longer in control of the landing lights. He glanced quickly at Arielle and saw flickering eyes on a serious face alternating glances between console display and cockpit window. He turned his glance back out the window. They were rising rapidly up the steep slope of the flowing water. Ahead of them was a tumbling block of jagged ice over thirty meters in diameter.

"Twelve o'clock high!" he said.

"Got it," said Arielle. The nose dipped and *Dragonfly* dove deep into the water. Gearge watched the undersurface of the iceberg pass overhead, not ten meters away. Now that they were deep in the water, they were relatively safe from the ice chunks floating above, but they were being carried downslope by the turbulent water. *Dragonfly* creaked as its wings were stressed near their limits.

"Can't ftay here," said Arielle. "Up we go. Help me find a gap." She turned the giant plane on its tail and applied full thrust with the fans to accelerate the rise of the buoyant airplane in the dense water. George peered out, trying to see beyond the reach of the landing lights. There was a large white shadow far above them, then another.

"Bogie at twelve o'clock, another at two o'clock low . . . a little one at eleven . . ."

Arielle went into a spiral, then stopped with the wings aligned with the flow of the water. The shaking and creaking

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abated a little as they drew closer to the ice-cluttered surface.

"Big one at twelve o'clock low," warned George.

"Fee anything on the high tide?" she asked, adding her eyes to his.

"Nope," he said.

"Then we go that way," said Arielle pulling them upside-down for a moment, then resuming the upward climb. George watched the iceberg pass beneath their nose as the plane broke through the surface of the dense water. The plane hesitated as it entered the lighter ocean water and lost much of its buoyancy, but continued its climb on the fans. Arielle set the controls for a steady climb, then changed her display to the sonar.

"How far to the top?" she asked.

"Twelve kilometers," said Jill. "At our present rate of ascent we should reach the surface in two hours, but the tide is coming back in and the surface level is increasing, so it will take longer than that."

There was a rumble through the water. Arielle tilted the plane back and they peered upside down at the volcano below them. A bright spot of yellow-white welled up from the crater and poured down the slopes in all directions, covering over the dull-red cooling flows that had preceded it.

"I'm really surprised that the flouwen put us there," said George. "They nearly killed us."

"Don't forget," reminded David. "They normally have better sense than to be in this part of the globe during periapsis. By the time they get back, the lava would have cooled off and been covered again by snow."

There was a rattle on the hull as they ran into a flurry of faceted hailstones. Arielle tilted the plane back and they continued their climb. With the plane on autopilot, Arielle finally noticed the pink elastic cuffs on her wrists and looked down to see she was still in her bunny suit.

"I think I'll go get dreffed," she said to George, blushing slightly. She unbuckled her seat belt and fluttered lightly down to the rear of the airplane.

Richard climbed up to take her seat so he could look out the window of the cockpit. "That was close," he said.

"You just witnessed the most spectacular feat of underwater flying you'll ever see," said George.

"And with mismatched fans, too," added Richard. "That girl is *some* pilot!"

"Yeah," agreed George. "Pretty, too."

"Yeah!" agreed David.

"Men!" muttered Gretchen.

After about half an hour Arielle climbed up to join them again. The Neuskin bandage was off her lip, and some carefully applied makeup made the fine line of scarless new skin almost invisible. She paused when she reached the cockpit, stuck her head up between the two men and smiled. The imp-brace was still holding her tooth in place, and lights flashed between red lips.

"I have my seat back now?" she asked.

"Sure," said Richard. He unbuckled and climbed down, using various nooks in the scanner instrument racks as hand and foot holds. He paused to boost Arielle up to her seat, then stepped down to stand on the strut holding Gretchen's

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console chair to the deck. She swiveled and looked up at him, her calves brushing against his.

"I'm making lunch down below," he said. "Any preferences?"

"Soup would taste good," she said.

"No soup," he said. "I just washed my hair and with our present attitude you'd be sure to spill some down on me. Finger foods only."

"Proto-cheese and an algae-shake in a squeezer, then," she said.

Richard picked up some other orders in his climb down, and soon lunch was being passed up by a busy Christmas Branch as *Dragonfly* continued its vertical climb. Lunch break entertainment included a replay of the two-way snow show.

Through bites of a pseudo-sausage, George discussed the sonar display with Jill.

"What are those bars that move across the screen?" he asked.

"Those are wind waves," said Jill. "Although we have passed high tide and the ocean is falling again, the sun has heated up Eau's atmosphere and the winds are now blowing up the mountain again. We're now so close to Barnard that we get a lot of heating, and the winds are quite strong and make large waves."

"How large?" said George, not really sure he wanted to know.

"They are 100 meters high, have a wavelength of 50 kilometers, and are moving at 200 kilometers an hour."

"That sound dangerous," said Arielle in a worried tone. "Shall I slow us down until the waves get littler?"

"Are the tops breaking?" George asked Jill.

"The sonar gives no indication of it, although I am sure they will as they approach the inner pole and grow larger."

"No, Arielle, keep her on the same heading," said George. "We've got to get to the surface and warn the crew at Rocheworld Base about the danger. Besides, I've got an idea for putting those waves to a good use."

SURFING

"Two kilometers to go!" said Gretchen from the engineering console. She took another sip of her algae-shake and grabbed it between her knees as her fingers tapped over the screen.

"Whoops!" cried David. "What happened?"

The airplane heaved upward, rotated slightly, then dropped again. In the process it shook something loose that clattered its way to the tail of the airplane.

"It was a wave going by overhead," said George. They continued their rise. The darkness above began to turn a dark green, then grew lighter and redder.

"Good!" said George. "These waves are a little sportier than I'm used to, but I least it'll be daylight when we break the surface so I can see them coming."

"What are you going to do?" asked Richard, his head sticking up into the cockpit area.

"We're still a hundred kilometers from the 95% confidence pickup footprint region," said George. "The waves are heading our way, so I'm going to surf them!

"Gretchen! The minute we break the surface I want you to lock onto a comsat

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and send a message to Rocheworld Base to warn them of the interplanetary waterfall. The first one is only two hours away."

"Right!" said Gretchen, and her hands became busy on the screen as she set up the automatic track, lock, and speedsend of the critical message.

"I'll take it now, Arielle," George said to Arielle. She lifted her hands from the controls, tightened her seatbelt and lay back, her hands folded across her stomach, but her eyes constantly flickered between console and cockpit window. George rolled the plane from its vertical climb into a steep bank, headed in the same direction as the wave motion.

"Until now I've regretted that decadent summer I spent between college and flight school. Three whole months in Hawaii doing nothing but surfing the pipeline off Diamond Head. This is one crazy surfboard, but it's the best I've got." He ran the fans up until an overspeed indicator lit up. A map on his screen showed a line that indicated a wave overtaking a tiny red dot. Watching it, George pushed the speed control even higher, and the *Magic Dragonfly* shot upward until it broke through the surface of the water on the forward face of the speeding wave. For a few seconds the plane was airborne again, enough so that its tail broke free of the water. George dipped the nose and dove down the sloping front of the wave, gaining even more speed; then the airplane-turned-surfboard settled its hull into the water. George kept the fans lifting, and that together with the rush of air passing under the wings kept the hull from sinking and dragging them under.

"Comin' down!" hollered George, his hands constantly moving to keep the plane balanced on the blanket of air passing under its wings. While the speedsend message was clattering over the link between Jack and Jill, carrying a complete description of the alien play and Jill's interpretation of it, Gretchen talked directly with Thomas.

"At the next high tide, there's going to be the first of a number of transfers of the ocean from Eau to Roche," she said.

"That bad?" said Thomas. "We saw the tidal bore turn into a geyser at the last change of tides, but that one just blew a little spray into the zero-gee region. We never realized that it would go that far."

"What tidal bore?" asked Gretchen.

"This one," said Thomas. Gretchen saw him glance down at the console screen in front of him. Then his face was replaced by a speeded-up, time-lapse picture of a large ring wave, starting at the base of the water mountain just after low tide and rising rapidly up the conical mountain of ocean.

"It covers 600 kilometers in the hour and a half between low and high tide," said Thomas, "and it gets bigger and meaner as it's compressed into the small area around the peak. You'd better dive under again before it gets you."

"We can't," said George. "*Dragonfly* was never meant to be a submarine. Unless we have some rocks or heavy aliens for ballast, we always have positive buoyancy. We'll have to think of something else." His words sounded strained by the effort to maintain the delicate balance of lift, speed, and drag on the face of the moving wave.

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"We're moving pretty fast," said Gretchen. "Can we turn on the nuclear jet and take off?"

"I'm aqua-planing and the tail is dragging the surface," he said. "If I open the air scoops, all they'd pick up would be water, and the nuclear jet can't handle that."

"How about the monopropellant?" said Gretchen. "I know it's meant for space use, but it could at least get us airborne enough so that we could switch to the nuclear jet."

"I'm afraid not," said George. "Don't forget that the exhaust port is underwater. If I introduced the monopropellant into the chamber, it would be like trying to fire a shotgun plugged with dirt. We'd blow the tail off."

"There must be some way," said Gretchen. "How about having Jill divert some of the crew air supply through the jet in place of the monopropellant? That would give us enough boost to get airborne; then we could open the scoops and turn on the nuclear jet. I'll get Jill to figure out whether it will work."

"Such diversion of crew air supply is not allowed," said Jill in its severest tone. "Calculations will not be done on disallowed options."

Gretchen didn't argue, but turned to her console and spoke as she typed in a code word.

"SEM-1, this is Chief Engineer Gretchen Krupp—password NORDIC, priority F1. Suggested diversion of crew air supply is essential to save crew from certain death by tidal wave. Obtain authorization to consider diversion from Flight Commander and Mission Commander, then proceed with analysis."

In a few seconds Gretchen heard Jill again through her imp. "I still object to the diversion, but my objections have been neutralized. The analysis shows that your plan is feasible, although it will take the outside imp fifteen minutes to rearrange the plumbing in the tank section. The amount of stored gas available is still not enough to lift the plane from the water by itself. We will need more airspeed and a downhill run."

"I can get that," said George. "On the face of a wave—the bore wave. If it's big enough and we time things just right, we can be airborne before we get trapped by the curl at the top." As he talked, he adjusted the pitch of the nose, and the plane lifted a little and climbed up to the top of the wave.

"The wind is dying down and this wave is going to peter out soon anyway," he said. "Might as well get off here and get ready for the big one." He dipped, then rose; the wave slipped out from under them and the *Dragonfly* settled into the trough behind. The short day was almost over and Barnard was setting in back of them over Eau. They watched the sunset through the long-distance lens of the scanner video, and as they watched, a frothy wave grew on the horizon and swallowed up the sun.

"We're going to have to do this in darkness, Gretchen," said George. "I want you to get me an IR and low-light-level video picture of this region from the comsat." He turned to Arielle.

"Get your suit on, Arielle, then come back and relieve me. If the wave gets us, *Dragonfly* is going to get broken up. Not that the suits will keep us alive much longer."

He cleared his screen and pulled in the IR image from the comsat overhead.

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Dragonfly was a tiny hot cross in the middle of a blue ocean. He zoomed the picture back until *Dragonfly* was a tiny white dot. Then he saw the warm yellow whitecaps at the peak of the bore speeding toward them, leaving a roiling, blotchy sea of warm and cold patches behind it.

"How much time do we have?" he asked Jill.

"Twenty minutes."

Arielle was standing at his shoulder, her pert face and curly hair distorted by the fishbowl helmet on her head.

"Your turn," she said, climbing into the pilot seat and copying his display.

"Not much to do except wait," said George. "See you soon." He made his way to the back where Gretchen was waiting for him, holding his suit open.

"How is the tank switchover going?" he asked.

"It was completed five minutes ago," she replied. "Fortunately we'd never used the monopropellant line to the main engine, so it didn't need to be purged. Here, let me get that zipper while you get your helmet on."

Five minutes later everyone was suited up and at their stations. "I've got it on the scanner camera," said Gretchen. David picked up her display on his console and watched the stars disappear one by one as the horizon in back of them rose.

"It's a kilometer high!" he said.

"It is 1.7 kilometers high and growing," said Jill. "It will be over two kilometers tall by the time it reaches us."

"The bigger, the better," said George, increasing the speed of the fans into the danger region once again as *Dragonfly* fled the approaching wave. "There is no way we can build up enough speed to surf this one, but if it's tall enough, we can get airborne and away before the whitecaps at the top slap us down."

The view from the back through the scanner camera became blacker and blacker as the wave rose up to cover the sky. The crew felt the plane tip forward and rise upward as if they had hit an updraft. The horizon in front of them dipped, and the landing lights shone downward at the falling ocean surface. They were a half kilometer up in the air.

"Now!" said George, as he manipulated the controls that normally controlled the thrust level of the monopropellant rocket system. The plug of water was blasted from the jet exhaust by a burst of air, and *Dragonfly* leaped forward. The sea was briefly illuminated from behind by a brilliant yellow-white blowtorch flame as the oxygen combined with the ammonia and methane in the atmosphere.

"Wow!" said George. "I forgot about that effect." He turned to Arielle. "We're in the air."

"I got her, George," she said. She dove down the surface of the wave until they had sufficient airspeed, then opened the atmosphere scoops and pushed forward on the throttle for the nuclear jet. There was a pale glow from the rear as the heated atmosphere rushed from the exhaust. The plane lifted from the face of the towering wall of water. A cheer arose inside the plane, echoed by cheers from the lander. A noticeable fraction of a second later, cheers could be heard from the remainder of the crew on *Prometheus*.

"We're airborne, Rocheworld Base,"

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said George. "We'll meet you at L-5 where we can watch the show, then transfer for the trip out to *Prometheus*."

Suddenly there was a yellow-orange glare from behind and the ominous thuds of control rods being jammed into a reactor core at emergency speeds. The thrust stopped.

"Reactor overheated," reported Jill. "We have a major leak in our liquid-sodium heat-exchanger loop."

"It was corrosion from the ocean water," said Gretchen. "I was afraid of that, but there was nothing we could do."

"Switch to monopropellant!" hollered George, beginning to panic. "We've got to get altitude!"

"The monopropellant tanks are no longer connected to the jet," reminded Jill.

"Fire the air jet then. Do something!"

"I will glide," said a quiet voice, and the silent cabin tilted as the tiny pilot came into equilibrium with the wave above and behind them, surfing on the pocket of air pushed in front of the wall of water.

Using her glider experience, Arielle slid back and forth on the air in front of the bore, gaining a little altitude each cycle. The crest of the wave was still far above them, growing taller as they approached the inner pole. Arielle called up a comsat low-light-level video image of the ring wave converging to a central point. On one side of the ring was the dot of *Dragonfly*, its landing lights making it visible from space. For a long time Arielle stared at the screen, judging the motion of the plane and the converging wave—trying to imagine the ring of invisible air trapped just inside the converging ring of water. Suddenly she dipped the nose of the silently gliding airplane, and trading altitude for speed, streaked down the surface of the wave and out across the flat ocean, putting the wave temporarily behind.

"Just like cliffs at La Jolla," she said as she streaked straight at the opposite wall of the twenty-kilometer-high ring wave. Trading kinetic energy for altitude, she pulled *Dragonfly* into a steep climb and zoomed almost straight up. Rolling out, she picked up the top of the air geyser starting at the center of the ring. They were thrown upward, and Arielle fought her way out from the turbulent center to the strong outside winds.

George stared at his screen in fascination, watching the converging ring of white water as seen from the comsat image. The ring contracted into a foaming circle.

"The water geyser has started," said Gretchen. "You'd better get us to one side. The water has a lot more energy and inertia than the air, and it's going to blast its way up here at high speed."

Arielle nodded and pulled out and upward.

"We're only ten kilometers from the zero-gee point," said David, watching a trajectory plot on his console screen.

Arielle allowed herself a little smile.

"We make that easy," she said. "Then she is all downhill to Rocheworld Base. How many do we have to go?"

"Fifteen hundred kilometers," said David. Arielle was silent for a minute.

"Well, I have forty kilometer altitude. Too bad my *Dragonfly* is not a

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real glider. I could make that easy. We shall see . . ." They all hung loosely in their seats as *Dragonfly* shot through the zero-gravity neck and started downward for Roche.

"Look ahead," said Arielle, pointing to a thin line of red light on the dark globe ahead of them. "We have come out on the other side. It is dawning at Rocheworld Base."

"Here comes the geyser," said Gretchen, who was watching toward their rear through the scanner instruments.

George copied Gretchen's screen. It was too bad that the sunlight wouldn't reach into the inner poles for another hour. If it was this impressive on the IR scanner, it would have been spectacular on video.

"How thick would you say it is?" he asked.

"About ten kilometers," said Gretchen. "The column is starting to break partway up."

George watched as the top portion of the geyser pushed its way through the narrow gravitational neck between the two planets, then started its slow fall toward the rocky lobe below. In the infrared scanner, every one of the volcanic craters below the falling frothy blob had a bright red pseudo-color, while the pseudo-white ones could be correlated with the view out the cockpit window of the patches of real red dotting the black peak of Roche ahead. On the Eau side of the blob, the geyser column thinned out as the base fell back under its gravitational pull, while the top portion continued to coast through the zero-gravity region.

"That's the first one," said George. "Get me Rocheworld Base, Gretchen." Soon Red's concerned face was on his screen.

"The first batch of water has transferred over and is heading for the surface. We've still got 1500 kilometers to go and no propulsion power. The only thing that's keeping us up is Arielle. You'd better leave without us. We'll try to crash-land on a high ridge when we run out of altitude. If the next two sploshes don't get us, you can come back again and pick us up."

"We're not leaving until we're in real danger," said Red determinedly. "How big is the water ball?"

"I would guess about 1500 cubic kilometers," said George. "How about it, Jill? Will it get to them?"

"The amount of water transferred is sufficient to cover Roche to five centimeters deep."

"Hah!" said Red. "Just barely enough to get our feet wet."

"But you're in lowland country," said George, looking at the sunline moving rapidly across the surface of the rocky globe. "And right in line of one of those channels leading from the inner pole. It sure is obvious now what caused the erosion in those channels."

"You just keep coming," said Red. "We'll stay here until we see the whites of their tides."

"The leading edge of the drop is hitting the surface," said Gretchen. George switched his screen to Gretchen's IR scanner view. For a few seconds all he could see was a cold blue column as seen from above, partially blocking a dull red, warm conical mountain with yellow and white hot spots. Then at the base of the column exploded a boiling

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cloud of yellow, as the icy water poured down on the red-hot lava of the erupting volcanos. For twenty minutes the torrent continued to fall, and soon the base of the waterfall was hidden in an expanding cloud of steam. From the bottom of the cloud streaked rivers of water streaming down the channels, riding a layer of steam over the tongues of lava that had preceded them. Fingers of steam rose into the air, twirled by the strong coriolis forces near the center of the rapidly spinning double planet system. Large, lazy tornadoes were spawned and moved ahead of them across the sunlit planet.

"Just what I need," said Arielle, putting *Dragonfly* into a dive that was aimed at the base of the nearest tornado.

"What are you doing!" shouted George in alarm, yet he knew better than to try and stop her.

"We still have thousand kilometer to go and I need altitude," said Arielle. She turned to grin at him, knowing full well what was bothering him. "You western types are used to high-gee twisters that can rip apart airplanes," she said. "Just look down the throat on that one, George. It over one kilometer in diameter. Just pretend it's a thermal — with clouds in it."

George did relax a little at that image, as Arielle dove the plane at the ground. Timing her approach carefully, she swooped in under the funnel at high speed as it lifted a few hundred meters from the surface. She slammed *Dragonfly* into a tight bank and started spiraling up.

"Are you *sure* you've never flown fighters, Arielle?" asked George as the gee load pinned him to his seat.

It may have been a lazy tornado, but it was still more tornado than thermal. The first few turns were through rough air that had *Dragonfly* creaking. Something broke loose in the rear of the plane and banged around until the Christmas Branch corralled it. It was dark grey inside the funnel, but they had plenty of light from the almost continuous flashes of lightning. *Dragonfly* was struck twice on the wing and had Gretchen and Jill frantically reconfiguring circuits to work around burned-out cables. As they spiraled upward, the radius of the funnel widened and the turbulence dropped. They clattered through a small cloud of blue hailstones, then flew out the top just in time to witness the sun setting behind Roche. Arielle set the plane on a long shallow glide angle and reached up to take off her helmet.

"We have still 1000 kilometer to go, but now we have some altitude. It is not enough, though." She turned to look at Gretchen. "Could I please have monopropellant tank reconnected?"

"Jill and I did that long ago," said Gretchen. "But it isn't going to do us much good. It'll only give us 15 minutes of thrust."

"That's enough to get us up out of here to L-5!" said George.

"If that were true I'd have mentioned it long ago," said Gretchen. "Unfortunately, we no longer have the nuclear reactor to augment the monopropellant exhaust velocity. By itself the monopropellant isn't strong enough to put us in orbit, even from this low-gee planet."

"But it can give me altitude," said Arielle. "And altitude means distance."

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Arielle turned to George. "Keep glide angle shallow and let me know when we at one kilometer. I'm going to get something to eat and take a nap." She hopped down from the flight deck and made her way back to the galley, where an open-mouthed George heard her order a huge meal from the galley imp. He shook his head and turned back to the console. There was no way he could get himself to sleep at this point. He looked at the control settings and started to reach for them. He slapped the back of one hand with the other.

"No need to fiddle with them, George," he muttered to himself inside his helmet. "The lady's setting is perfect." To pass the time, he watched the second of the interplanetary waterfalls as seen from Clete and Walter at L-4 and L-5 and discussed them with Gretchen and Red.

"This one looks smaller," said George. "Of course, I was closer to the last one."

"It is smaller," said Red.

"How come?" said George. "We're closer to periapsis and the tides should be stronger."

"Thomas has been modeling the details of the system, including simulating the ocean with a collection of tiny mass points. There's some complicated interaction of the orbital dynamics with the rotary dynamics and the tidal dynamics that makes the periapsis high tide slightly smaller than the two high tides before and after periapsis."

"Don't forget the atmosphere," said Gretchen. "At periapsis Barnard is heating Roche, and Eau is in shadow, so the atmospheric winds are blowing down the mountain. At the high tides before and after, Barnard is heating Eau, boiling off the ammonia and adding wind waves to the tidal bore."

"There doesn't seem to be as much steam this time, either," said George, as they watched the blob of water fall on the volcanos and drown them in a torrent of icy liquid. The sun was rising on the other side of Roche, and although both airplane and lander were in darkness, Clete gave them a sunside view of the forming of the north and south polar vertical tornadoes, made visible by the steam boiling up from the point of Roche.

"Wow! Look at that!" said Red, as a silvery tongue sprang out from the shadows of the inner pole and moved rapidly across the sandy valleys of Roche.

"That's why I think you'd better get ready to leave," said George. "The volcanos are drowned and are no longer boiling away the water. With the head and the velocity that the blob builds up dropping the forty kilometers from the zero-gee region, you get air entrapment, just like an avalanche. Those fronts must be moving at 500 kilometers an hour."

"I've got an IR image of the flow below us," said Gretchen.

"Let's see it," said George, and his screen flickered to show the dull red, warm rock beneath them. Streaking out in fingers from the grooves worn in the rocky point of Roche were cold blue streams of high-speed menace.

"Doesn't look good," said George. "Are you ready to go?"

"Yes," said Red. "But we've voted to stay."

George started to argue with her, then

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lapsed into silence as one by one the fingers of speeding cold water seemed to stumble and break into a warm yellow froth. The trapped air layer had failed and dumped the tons of high-speed water into the salty sands, where it spread into a more slowly moving flood.

"See, George?" said Red. "No problem."

"That one got within 100 kilometers of you," said George. "You leave when the next one hits. That's an order!"

"You just get here before it does," said Red. She paused. "That's an order."

"Yes ma'am!" he replied.

"We're at two kilometers' altitude," reminded Jill.

"Wake Arielle up," he said. "We need altitude."

Ten minutes later Arielle strolled down the corridor nibbling on a large chunk of pseudo-cheese. She paused at Gretchen's console.

"We are ready with a maximum altitude program?" she asked pleasantly.

"It will use all but 10% of the monopropellant, but it will give you twenty-five kilometers," replied Gretchen. Arielle wrinkled her nose, then had a short conversation with her imp.

"I take all 100%," she said.

"Don't you need some in case there is a problem with the landing approach and you have to go around?"

"Don't forget," smiled Arielle. "There is no such thing as a go-round in a shuttle landing." She tossed her head to get the curls out of her eyes, climbed up to the pilot seat on the flight deck, and strapped herself in.

"We are ready?" she asked. After a pause, she dove the airplane at the invisible surface below.

"I do wish you had radar back, Jill," she said as she watched the blurred IR image grow in her screen.

"Aren't we getting a little close?" said Jill.

"The monopropellant gives a little better thrust when used with high-density air," said Arielle confidently.

When the IR image stopped looking blurred, Arielle pulled *Dragonfly* out of its dive, opened the atmosphere scoops slightly, and shoved the throttle all the way forward and held onto it as she turned the long-winged airplane into a vertical rocket. Only when the roaring from the rear of the plane had subsided into empty coughs did the little hand pull the throttle back to its initial position. No one moved as the plane coasted up on its inertia, the crew floating lightly in their harnesses after the high-gee climb. At the very top of the climb, Arielle switched to the space attitude control system, and with the last bursts of monopropellant left in the lines to the nose jets, she tilted the plane forward and again started the long glide toward Rocheworld Base.

"Five hundred kilometer to go," she said. "How much time we have?"

"The next waterfall comes in ten minutes," said David. "But it takes twenty-five minutes to fall and then the flood has to travel from the inner pole to Rocheworld Base. It depends upon how fast the water travels, and that depends upon how long it stays in the air-entrapment state. It could be two hours; it could be four; it could be that it never even gets there and we have all the time in the world."

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"I think I go faster," said Arielle, tilting the nose of the plane slightly. She put her console into compute mode, and long fingernails tapped on the screen as she and Jill optimized a curved trajectory that would put them at Rocheworld Base at zero altitude in minimum time.

"This is going to be a big one," said Gretchen, watching the ring bore build up on Eau through the IR imager on the comsats. Richard was sitting next to her at the science console. His screen had two pictures: one just like Gretchen's, the other taken at a similar time in the first of the tidal transfers.

"There must be a partial resonance in the ocean basins of Eau," said Richard. "This one is bigger than the first one that had the wind helping it."

The entire crew except Arielle watched their screens as the ring wave contracted and generated a thick climbing column of water. They watched in frozen fascination as the deadly menace rose like the head of a cobra from its coiled base. The underportions of the column thinned, while the top portion, which had enough momentum to overcome the weakening gravity, continued upward and squeezed its bulk through the zero-gravity neck, compressed to a ten-kilometer-wide throat by the strong gravity gradients pressing inward around the zero-gravity point. The blob grew into an ellipsoidal ball on the other side and started to stretch as the lower portions were pulled along faster than the upper regions. Richard's screen had an overlay that Jill traced out around the IR image of the elongating ball.

"It's thirty kilometers long by twenty in diameter," said Richard. "That's enough to cover Roche a half-meter deep in water."

"And the volcanoes aren't going to be much help in evaporating this one," said George.

As the ball fell, it pushed air ahead of it and flattened out on the bottom. When the drop reached the surface, the air under it built up in pressure and squeezed out at high speed from the edges, only to find itself trapped from above by an enlarging blob of water that moved rapidly over the nearly frictionless air, trading its gravitational head and inertia for speed.

"The bottom is moving like an express train, and the top is still falling!" said George.

"It's faster than an express train," said Richard. He generated a new "tagger" from the menu at the side of the screen and moved it with his finger to the front of one of the racing tongues of water. The green cross "tag" stuck at the change of illumination between the blue cold water and the disappearing warm red rocks of Roche. Richard's finger went back to the menu and picked out a parameter—VELOCITY.

"580 km/hr," came the indication on the screen.

"It'll be at Rocheworld Base in less than three hours," said Richard. "Are we going to make it in time, Arielle?"

"We also arrive in less than three hours," she replied calmly, her eyes on the ground speed indicator. She pulled back slightly on the controls to take advantage of the slight tail wind in the level they were presently navigating. She would later use the altitude she had saved to gain more speed.

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"Can you get us a more accurate time prediction, Richard?" asked George.

"I'll work on it," said Richard. A flick of his finger at the parameter ACCELERATION produced a positive number. He flinched, then read POSITION. He set up another tag at the position of Rocheworld Base, then read the separation.

"It's at 1300 kilometers from the base and still accelerating," said Richard. "The top of the drop is just feeling the back-pressure of the ground below, and the pressure head wave is still pushing out around the boundary. I'll have to wait until the acceleration stops before I can predict an accurate arrival time, but it looks like two hours and fifteen minutes."

George glanced at Arielle. She was moving very slowly and deliberately, with only the rapid movement of her eyes giving any indication of the whirling thought processes going on under the curly hair. She was in her "test pilot in trouble" trance. A silence fell over the ship as everyone waited for her to speak.

"I would like rest of air, please. At any point below two kilometers' altitude would be useful." She dropped out of her trance and turned away to tend to her flying.

"Everyone back in their suits," George said. "And give Gretchen one of your suit tanks. One tank will last more than two hours, and that's more time than that bore will give us."

"Reconfigure the plumbing again, Jill," said Gretchen to her imp. "I'll get the tanks hooked up to the supply lines, and you drain them as fast as you can."

"Unless you object, I will also increase reactor power above safe limits and generate some oxygen and hydrogen by electrolysis."

"Good," said Gretchen, swinging from the console seat and walking down the corridor in the 12% gravity. At least they would have some solid footing for their dash to the lander.

Richard was soon suited up and back at his console, his bloated silver fingers pulling information off the image on the screen. The bore was now out in the sunlight. From a distance it looked like a river of quicksilver in the lined palm of an old Indian soothsayer.

"The pressure head is decreasing, and the velocity is 610 kilometers an hour, three times faster than we're gliding. The separation distance is 880 kilometers. Estimated time of arrival one hour and twenty-four minutes."

George glanced over at Arielle, looking for the trance. There was a pause as the colloid computer integrated a lifetime of experience in the air with the present situation and the new numbers.

"I think I have some bite to eat before I suit up," she said, hopping down from the flight deck. "I'm hungry. You keep watch on my *Dragonfly* for me, George?"

George grinned through his visor and checked over his control panels. For some reason his shoulders felt as if they were in a region of lower gravity.

"Don't dawdle," he said in a pseudo-gruff voice. "Gretchen wants to have Jill suck up the last of the cabin air after we're all in our suits." Arielle strolled down the corridor in her trim, tailored jumpsuit, weaving her way around the armored forms of Richard and David.

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She stopped at the galley for a slab of pseudo-chicken, then, ignoring a patient Gretchen holding up her open suit at the end of the corridor, disappeared into the head.

Ten minutes later a refreshed Arielle with a newly made face exited the bathroom, where she was set upon by an exasperated Gretchen, who unceremoniously stuffed her into her suit. As soon as the last seal was closed, the suit started to balloon as Jill pumped the air out of the cabin and added it to the tanks.

"Five kilometers' altitude, Arielle!" hollered George through his suit imp.

"And the bore is at 500 kilometers and still levitated," said Richard.

Arielle made her way back up the corridor and climbed into the pilot seat. She checked the display carefully, her hands still folded in her lap. Satisfied, she raised her hands and nodded at George. He nodded back, and she took control again with the flick of a few switches.

"I like status report, Richard."

"Bore distance from base is 460 kilometers, velocity 550 kilometers per hour, arrival time forty-eight minutes."

"Jill, we arrive in forty minutes?"

"Forty-one," replied Jill.

"Too close," said Arielle. "I use air." She pushed forward on the controls and dove *Dragonfly* at the ground. As she pulled up, she triggered the valve and the last of the air supply shot out of the jet in a blue-yellow flame. Arielle stopped the climb and pushed Dragonfly into a fast glide at a still-invisible target eighty kilometers away.

"Jill?" she asked.

"Twenty-four minutes."

"Richard?"

"Thirty-four minutes."

Arielle made one tiny adjustment to the controls, tightened her seat belt and shoulder harness, then put her hands into her lap. She turned to look at George out of her helmet.

"We have hard landing," she reminded him.

"And just ten minutes to get the five of us up the side of the lander." George tightened his seat belt and turned to Gretchen.

"How many can we get in the airlock?"

"Three easily."

"You, Richard, and David get into the lock and cycle it, but don't open the outer door until we've stopped moving. Put your backs to the front wall and take some bedding to protect your helmets."

"Are you and Arielle going to have time to cycle through? We could cram in five."

"You forget someone has to land this thing, and I'm not leaving Arielle up here all alone. The minute we stop I'm blowing the front canopy and Arielle and I will go out over the nose. Red! Are you monitoring?"

"Yes," came the reply from Rocheworld Base.

"Is the winch down?"

"Yes," came Red's voice over the intercom. "Ready and waiting. Hurry!"

"I see the bore on the scanner video. It's gaining on us," said Richard.

"Give us a last reading on time difference, then get in the air lock!" said George.

"Eleven minutes," interrupted Jill. "Get into the airlock, Richard." Richard obeyed and trotted to the rear of the plane and the lock door closed behind

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him. George and Arielle were left with the hiss of air passing over the silent airplane and the distant throb of airlock pumps going through their motions on almost non-existent air. Now George could see the lander sticking up into the air, its dark outline standing to just one side of the setting globe of Barnard.

"Bad luck!" complained George. "We're flying right into the sun."

"No! It good!" said Arielle. "I see rocks easy now because of they big shadow." She banked the plane slightly to pick a path that was relatively clear of boulders and gave up the last of her altitude for speed.

"Brace yourself!" screamed Jill to everyone but Arielle. Arielle pulled the plane up, slowing it abruptly.

"Flaps!" she commanded. Both her hands were busy, one with the airplane controls and the other operating the fans at full reverse thrust. George pushed at the flap controls, but found that they were already moving.

"Flaps down," he and Jill said at the same time. The plane started to drop heavily to the surface, the forward speed almost gone. Arielle brought it almost to a stall and then, just before touchdown, dipped it just enough to keep some control as it slid through the sand directly toward the lander.

We're going to hit! thought George, his throat too tight to speak.

Arielle wrenched the rudder around as she twisted the fan controls. The *Magic Dragonfly* went into a broadside slide and came to a stop with its nose on one side of the lander and the left wing on the other, not ten meters from the fragile legs of the cylindrical rocket.

"George! I made ringer!" shouted Arielle with delight.

"BLOW THE HATCH!" came a sharp command in George's ear. His thumb flipped the safety cover, but a waiting imp beat his gloved finger to the switch underneath. There was a loud BANG! The cockpit windows flew into the air and the ammonia-methane atmosphere rushed into the plane. There was a dull THUMP! as the inflowing gasses burned on contact with the residual air. George clambered out on the nose and jumped to the surface, then turned to catch Arielle. Together they hurried toward the distant lander.

Jill, her voice turned into that of a martinet, drove them with verbal whiplashes. Over the voice George could hear leakage from the data link between Jack and Jill.

"GRETCHEN, RICHARD, DAVID — TO THE WINCH. GEORGE, ARIELLE — UP THE LADDER. RED, START THE WINCH AND GET THEM UP AND IN!

"MOVE IT, GEORGE!

"ARIELLE IS WAY AHEAD OF YOU!

"*MOVE IT,* YOU FAT OLD MAN!"

George found another source of adrenaline in his anger and sprinted harder for the ladder. Arielle ran lightly up the rungs on the landing legs without using her hands. When she reached the main body of the lander, she crouched and leaped up the side of the rocket in the low gravity, then continued on, hand over hand, her legs dangling. George knew he couldn't do that and scrambled rung by rung after her. He got up the landing leg and paused to look up at Arielle.

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"NO SIGHTSEEING! MOVE IT! MOVE IT!! MOVE IT!!!"

Jill's voice took on a harsh tone that sent George back to his first week in ROTC summer camp under the tender ministrations of a drill instructor. Fear and hatred drove him up the ladder. He could see the wall of water coming over the horizon to his left, its foaming top colored blood-red in the setting sunlight. The water was swallowing the kilometers-long shadow of the lander as George clambered into the lock with Red and the four others.

"I've got the winch stored," said Red. "Shut the outer door."

George started to close the door. He stopped. With him in the lock, there was no room for the door to swing closed. He stepped back onto the top rung of the ladder and pulled the door shut.

"George!!! Noooooo . . . " wailed Red.

"Take off, Thomas! That's an order!" said George.

The ten-meter-high wall of water hit the base of the rocket and it started to topple.

"Got to go!" said Thomas.

The atmosphere around George was ablaze with flame as the ascent module lifted from the falling rocket and boosted into the sky. George's feet slipped from the rung and he was left hanging by the inadequate grasp of his sausage-glove hands. As the acceleration built up, he found his left hand slipping from the vertical handhold. He grabbed for the horizontal ladder rung and got it, but lost his right handhold on the door handle. Dangling by one hand from the bottom of the accelerating spacecraft, he was blinded, deafened, and burned by the exhaust from the powerful rocket engine. He felt the suit cooling shift to maximum power to prevent his legs from frying in the intense heat. He tried to get his right hand up to the ladder rung, but the buffeting was too much. They hit max-Q and the supersonic blast was too much. His fingers slipped off the rung and he fell through the flaming exhaust toward the distant ground below. He was still moving upward, coasting on the momentum of the rocket that had left him behind. He came to the peak of his trajectory and started to fall.

Time seemed to stop. George found that he had automatically assumed the spread-eagle position he'd learned when sky-diving—only this time he didn't have a parachute. He felt a faint twinge of regret. Regret that he would never again see Loud Red and White Whistler and the others again. It was vitally important that they come back to this planet, even if it cost them another lander. The next time they should leave an interstellar laser communicator on the Hawaiian Islands so that the long-lived flouwen could communicate their advanced mathematical knowledge directly back to Earth, even after the evanescent human exploration crew had fluttered out the last of their mayfly-like lives.

George felt cheated. There was so much more he wanted to do on this world. Then there were all the moons of Gargantua to explore. Well . . . he had made it to Barnard alive and had fun exploring at least one world.

"We all have to go sometime," he said to himself. "Might as well get it over with."

He pulled in his arms from the spread-

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eagled position and dove headfirst for the ground.

"No! George! No!" screamed Red's voice. He resumed the spread-eagle position and looked around. The ascent module had dipped below and was rising to meet him. As it came closer, he could see a grinning black face peering up at him through triangular windows. The entry port at the top of the spacecraft was open. Reaching up from the lock was a slender, space-suited figure. She had a long lanyard, but it wasn't needed. Thomas swooped the rocket up underneath him and scooped him right into Red's arms.

"I was always the best one on the block at the ball and cup game," Thomas bragged.

George felt the acceleration increase as Red dragged him into the lock and the air cycle started.

"I nearly lost you!" said Red as she took off his helmet. Tears were streaming down her face and into her suit. George started to cry, too. He put his arms around her and tried to give her a comforting hug, but the suits got in the way. When Richard got the inner door open he found them nuzzling each other's faces, both wet with tears.

With his suit off and holding Red by the hand, George joined the rest of the crew in the view lounge. Arielle was at the telescope, tracking the fractured cross of duraluminum that used to be the *Magic Dragonfly* as it was borne off by the waves, the wing-tips crumbling as they were dashed against boulders and tumbling rocks.

"Goodbye, Jill," Arielle cried, her voice breaking.

"Arielle, dear," said Jill's voice through her imp. "I'm still here. You must remember that these voices we computers use are just to aid you in identifying which computer is talking to you."

As it spoke, the voice changed slowly from the overtones of Jill to the overtones of Jack. It then switched to that of James, who in its most butlerish voice continued to drive in the lesson as its voice changed to that of a tinny robot. "It is very important that you realize that we are noth-ing but ro-bots."

"You right," agreed Arielle. "I am silly to cry over computers." Then she burst into tears again.

"What's the matter now, Arielle?" said George.

"My *Dragonfly* was such a pretty plane, and now she is all broke!"

"We've got three more *Dragonflys* for you," said George reassuringly. "And you can spend all the rest of your life flying them." ■

● In the old days, it might take half a century or more to exhaust the possibilities of one great pioneer thinker's discovery. Today, with tens of thousands of brilliant men, with exceedingly powerful analytical tools, such as computer machines, nuclear reactors, and automatic data-gathering-and-processing systems, an idea can be run down in a hurry.

John W. Campbell

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The Alternate View

CHOOSE YOUR POISON

G. Harry Stine

All attempts by legislators and bureaucrats to make automobiles safe, fuel-efficient, and pollution-free have not only failed but have backfired badly. Whether or not this situation tells us something about legislating technology remains to be seen, because we're still analyzing the lessons we've learned from this modern technological version of the Eighteenth Amendment.

Basically and technologically, the three goals of increased safety, better fuel efficiency, and reduced pollution are incompatible. One cannot be solved without affecting the other two. It's a matter of choosing your own poison—i.e., the goal with the highest priority.

(Robert A. Heinlein accurately described the automobile in his novel, *The Rolling Stones*: the reader is urged to find the passage and read it carefully.)

There's absolutely no way to make an automobile safe for its occupants. Colonel John Paul Stapp discovered this thirty years ago when he learned that the Air Force was losing more pilots in automobile accidents than in airplane crashes. When he set out to discover why, he discovered that people are killed in autombile accidents because (a) the automobile structure around them collapses and crushes them, and (b) unless restrained in their seats, they rattle around inside the automobile and are injured on impact with portions of it. When you place a human being inside two tons of steel, propel the assemblage down a road at 25 meters per second, and then dissipate that kinetic energy by running said automobile into another object, something has to give . . . and it turns out to be flesh and blood, as well as steel and plastic. (What happens when an irresistible force meets an immovable object? Answer: An inconceivable concussion.) An automobile can be made safer, but are you willing to pay for it?

There's absolutely no way to make an automobile fuel-efficient in a manner that people would be willing to live with or pay for. The Otto Cycle infernal combusion engine which powers today's automobiles has a limit beyond which technology cannot take it, no matter what fuel is used. You *might* be able to achieve 25 kilometers per liter, but you'd have to give up both safety and pollution control. Forget about non-polluting electric cars, turbine cars, etc.; the basic characteristics of those power plants make them technologically, economically, and sociologically unsuitable.

And there's absolutely no way to make the Otto Cycle engine into a non-polluting device. It's possible to come close . . . for a price and at the expense of fuel economy.

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Yes, today's automobile is safer, has greater fuel economy, and produces less polluting emissions than the cars of a decade ago. But today's automobile costs three to five times that same counterpart, and is a study in social goal confusion brought about by incompatible technological facts. We're paying for the bastardization of engineering compromise, which results in a device that does nothing well at high cost.

The rising tide of automobile accidents in the 1960s led Congress to adopt the National Traffic and Motor Vehicle Safety Act of 1966. This act empowered the Secretary of Transportation to establish automotive safety standards because it seemed clear then that changing vehicle design and installing more safety equipment would make cars safer. To some extent, this worked, because by 1968 there was a marked decrease in accident rates.

But the public was growing increasingly concerned about air pollution which, in cities like Los Angeles, is primarily caused by the high-compression overhead-valve Otto Cycle engine. Actually, a 1946 automobile produced far less pollution than a 1968 model, in spite of its primitive engine technology. Technology had led engineers to the high-compression, high-rpm engine which, unlike the long-stroke, low-compression, low-speed flat-head 1946 engine, produced more pollutants because the chemical combustion process took place under vastly different conditions of temperature, pressure, and time. The Clean Air Act Amendments of 1970 were written in response to a swell of environmental concern. Congress, not a technically qualified voluntary standards organization, wrote the standards, because the legislators were afraid that others wouldn't establish strict criteria. As a result, the legislation contains impossibly high standards which could not, cannot, and will not be met.

Then comes OPEC, increasing the price of petroleum by a factor of four in 1974. And Congress passed the Energy Policy and Conservation Act of 1975, which established fuel economy standards for automobiles and mandated an average fuel consumption of 27.5 miles per gallon in 1985 automobiles.

Congress adopted all three acts with an intent to help and protect the American public. But they paid no attention to the contradictions among the acts and didn't bother to consider how these statutes would affect consumers in the areas of desirability or price.

A reasonable level of safety can be attained by seat belts. This was discovered in 1956 by Colonel Stapp in his auto crash studies for the Air Force. I put aircraft belts in my cars at the time, and everyone thought I was nuts. But I'd seen Stapp's data, and it's still valid today. However, only one person in ten buckles up. So there was an attempt to force people to fasten seat belts by designing cars that wouldn't start otherwise. This was so unpopular that public pressure caused Congress to rescind the regulation. The next move was to design passive restraints that worked whether or not they were fastened, and to require a car be designed and built so that the occupants would survive with only minor injuries a head-on crash into a barrier at 30 mph. And in spite of the fact that air bags help in a front collision but

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not in side, rear, or multiple collisions, they were mandated for 1982 models.

But what does safety cost? On the basis of the preventable injuries to cost ratio, passive belts cost $400,000 per life saved whereas air bags cost about $1,000,000 per life. Other devices such as improved door handles cost very little in this regard, while improved bumpers offer little or no increase in safety and only make cars more expensive. Over all, the safety equipment added to cars since 1968 have cost $300,000 to $450,000 per life saved. You and I have paid this.

This safety package also has added 200 pounds to the weight of a car and required additional fuel consumption of 2,500,000,000 gallons per year, which adds another $250,000 to the cost of saving a life.

Emission control devices designed to reduce exhaust pollutants have indeed reduced pollution, but have increased the cost of fuel consumption by $5,000,000,000 per year.

This seems like a Catch-22 situation, doesn't it? Safety regulations have decreased fuel economy by adding equipment and increasing vehicle weight. Emission controls have lowered fuel economy by reducing efficiency. Fuel economy measures have greatly affected safety by reducing the weight of the vehicle. Light vehicles greatly increase the chance of an occupant being killed or injured in an accident. If all cars on the road were small, we could anticipate improved fuel economy at the cost of 12,000 more serious accidents. But small cars would result in a savings of $19,000,000,000 in fuel.

Question: Are you willing to forego fuel economy to save lives and achieve low emissions?

Question: Are you willing to forego safety and pollution control to get better gas mileage?

Question: Are you willing to forego clean air to save lives and conserve fuel?

Choose your own form of poison. What are your priorities?

Regardless of government regulations and legislative standards, consumers in a free marketplace will make the final decisions. Consumers will buy the automobiles they choose and not buy the ones they don't want. They'll operate and maintain them the way they want consistent with traffic laws as enforced by the highway patrol. If they don't like the highway patrol, its budget will be cut next year. If they don't like seat belts, they won't use them. If emission controls are giving them poor gas mileage, they'll tinker with the controls to get better mileage at the expense of low emissions. Right now, people appear to be buying cars (or refusing to buy them) based on price and fuel economy with safety and emissions as low-priority items.

This whole automobile affair contains within it the essential elements and conflicts of modern society. It basically comes down to freedom of choice versus social regulation, with a secondary issue of non-technical people attempting to legislate technology. It'll be interesting to see the trade-offs that are finally achieved. As for myself, I want to be left alone and free to choose my own form of poison with a reasonable chance of not poisoning others in the process. How about you? But think before you answer!

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the reference library

By Tom Easton

Battlefield Earth, L.R. Hubbard, St. Martin's, $24.00, 800 pp.
The Purple Pterodactyls, L.S. de Camp, Phantasia, $15.00, 228 pp.
The Prisoner of Zhamanak, L.S. de Camp, Phantasia, $15.00, 228 pp.
The Reign of Wizardry, J. Williamson, Phantasia, $15.00, 193 pp.
Stalking the Nightmare, H. Ellison, Phantasia, $16.00, 304 pp.
A Rose for Armageddon, H. Schenck, Timescape, $2.25, 176 pp.
The Judas Mandala, D. Broderick, Timescape, $2.50, 192 pp.
Light on the Sound, S. Sucharitkul, Timescape, $2.95, 255 pp.
Star Seed, D. Andreissen, Donning (Starblaze), $4.95, 180 pp.
Merchanter's Luck, C.J. Cherryh, DAW, $2.95, 208 pp.
Dreamrider, S. Miesel, Ace, $2.75, 279 pp.
The New Visions, intro. by F. Pohl, Doubleday, $14.95, 87 pp.

"Old Mother Hubbard went to the cupboard
To get her poor dog a bone,
But when she got there, the cupboard was bare,
And so the poor dog got none."

Is Easton losing his mind? *Analog* is for science fiction, not nursery rhymes!

So true. But I'm perfectly sane, thank you. It's just that I couldn't resist, since I want to open my column this month with a Hubbard whose cupboard is in fact *very* bare.

The Hubbard is L. Ron. Remember him? The Golden Age writer who invented Dianetics and Scientology and got filthy rich? That's him. Now he's celebrating the fiftieth anniversary of his birth as a writer with an 800-page novel of "pure" SF, and he sucked St. Martin's into publishing it. It's **Battlefield Earth: A Saga of the Year 3000,** and it's a real stinker.

Why do I bother to tell you, then? Well, I do have the feeling I haven't

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been mean enough lately. That's because few books deserve the full treatment of finger-pinched nose and loud noises of disgust. They may not be real good, but their authors try and they don't usually fall flat on their faces. The editors keep the worst ones from ever reaching us.

Hubbard barely tried, fell flat, and I invite you to share a chorus of "pee-yew." The problem may lie in Hubbard's egocentric (or even egomaniacal) conviction that as a messiah or god-on-Earth he can do no wrong. "Pure" SF is what *he* says it is. Certainly the book's long introduction supports this interpretation, for there Hubbard says such things as, "To handle [my] fantasy material, Campbell introduced another magazine, *Unknown*." From what else I've read, I doubt that Hubbard was *Unknown*'s *raison d'être*.

Why do I bother . . . ? Hubbard is a N*A*M*E. He glitters with the gilt of yesteryear. Some of you will buy the book on that count alone. He's notorious, thanks to his religion. Some of you—and plenty of Scientologists—will buy the book for that reason. St. Martin's will make a bundle. But St. Martin's editors fell down on the job of protecting their customers from bilgewater, and I feel obliged to warn off any of you who will listen.

The story is a massive, save-the-universes (16—count 'em—16), wish-fulfillment fantasy wholly populated by the most one-dimensional of cardboard characters. The hero is Jonnie Goodboy Tyler. The alien villains are the Psychlos. (Others too have role-specific names.) Everyone looks his part—Tyler is noble and heroic, the Psychlos bestial, the cosmic bankers little grey men. No one plays more than a single note, over and over again. The characters are cartoons, and even so they are less believable than the ones in the funny papers. They are perfect examples of what novice writers should avoid.

The story is set a millennium hence, long after Earth has been depopulated by a world-wide gas attack. The Psychlos did it so they could gut the planet with mines. Only a few humans survive in isolated enclaves, descended to savagery. Tyler is one such savage, but he is driven by a noble curiosity and dissatisfaction with the status quo to leave his Colorado village and seek a wider life. Caught by a Psychlo with delusions of grandeur, he is educated with a telepathic machine, becomes civilized, contacts other humans, plots, and destroys the Psychlos lock, stock, and barrel, throughout the universes. He then manages to save the universes from the economic chaos that removing their Psychlo rulers has caused.

Sheeesh!

It's a story with scope, sweep, and grandeur. Human underdog conquers all, in the best *Astounding* tradition. Action galore, with gonads forgotten. Blood and thunder and mighty deeds. Gee, whiz! Is that what the Golden Age was all about? Gimme more!

Hokay, as Algis Budrys would say. It's good stuff for juveniles (no gonads, remember?). The Golden Age *would* have loved it. So why do I want to dump on it? Why does it give me a pain in last July's column lead?

For all the action, it plods and slogs, often lost in minutia. For all the sensawunda, it's as unlikely as a one-legged horse. And the thinking is sloppy, too.

Let me show you what I mean. On p. 187, Hubbard writes of over-revving alien motors which, he has already told us, don't "rev" at all, ever; they're "continuous teleporters." Worse yet, the motors are presumably at rest with respect to the entire universe. When on,

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they move and hold position by continually adjusting their location coordinates. Momentum remains zero. Yet, when the motors are turned off, motor and vehicle just sit there. There is no conflict of momenta of the sort you would see if you set a motionless brick in front of a speeding car or jet.

Maybe Hubbard just doesn't understand basic reality. On p. 294 he has his hero leap from a "plane" at hypersonic speed, unprotected—and he doesn't get smashed by the air.

More sweepingly, there's the Psychlos' excuse for raping Earth. They want metals, so they mine. But we know (don't we?) that mining is easier and cheaper on small moons and asteroids, especially when you can't breathe a planet's air. And speaking of air, the Psychlos' "breathe-gas" detonates when exposed to radiation. So okay, they come from another universe, where the elements and chemistry are different from ours. But what about cosmic rays? Background radiation?

Most fundamentally of all, there's that "kill-gas" the Psychlos used to wipe out most of humanity. Hubbard reveals some hundreds of pages into the story that there's a simple defense against it: all you need to do is breathe through a filter of salt. In that case, the gas can be no poison for Earthly animals, whose body fluids are just chock full of sodium chloride. As soon as the gas entered the body, it would be neutralized.

Enough. *Battlefield Earth* is a crock. The only way you could possibly enjoy it is as a satire of the Golden Age, whose weaknesses it bloats to elephantiasis. Unfortunately, I doubt very much that Hubbard meant it that way. Judging by his introduction, he meant it quite seriously as the epitome of SF: what the stuff should be at its best.

If he were right, we might as well all switch to mainlining tetraethyl lead. It would be more fun, and the mind-rot would be no worse.

In a kinder, more cheerful vein, I show you a whole stack of books from Phantasia Press, all with long-lived bindings and acid-free paper. There's Farmer's *World of Tiers* series, with *The Lavalite World* due out this fall. There's de Camp's **The Purple Pterodactyls,** a collection of Willy Newbery tales, and his new Krishna novel, **The Prisoner of Zhamanak,** whose plot is the rescue of a fair maiden held in durance vile by an alien potentate enchanted by sexual differences. (An Ace edition is scheduled for early 1983.) There's Jack Williamson's *The Humanoid Touch* and his early **The Reign of Wizardry,** concerning Theseus vs. King Minos. Finally, there's a new Ellison collection, **Stalking the Nightmare,** with a foreword by Stephen King. The book's a blend of fiction—don't miss "Djinn, No Chaser" and "The Hour That Stretches"—and nonfiction, of which my favorite is "The 3 Most Important Things in Life." Every word is Ellison, pungent and delightful.

I should add that Alex Berman, Phantasia's true persona and SFWA's own attorney, dreams of a future when he can order print runs of more than 1,500 copies per book and branch out to publish newer, less famous writers. Encourage him with orders. The address is Phantasia Press, 13101 Lincoln Street, Huntington Woods, MI 48070.

Another goody is Hilbert Schenck's **A Rose for Armageddon.** The scene is the near future, with the world on the brink of collapse. Everyone, but everyone, is on edge, and striking professors

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at a New England university are behaving like angry coal miners or teamsters.

Why are things falling apart? No one knows, but a team of scientists, led by a fiery wildlife biologist, grey-haired Elsa Adams, and mathematician Jake Stinson, is studying the interactional ("morphological") patterns of life on offshore Hawkins Island. They seek a key to the question of how people ever could have lived there in peace. The key eludes them, but the need for the key is greater than ever before in history, and time is very short. Elsa dreams of Armageddon. People gratuitously, maliciously interfere with the work, and success remains tantalizingly beyond their reach. When they finally attain it, it reminds us, in its likeness to some mystical navel of the world, of Schenck's *At the Eye of the Ocean*.

The novel's first portion is told from Elsa's point of view. She met Jake as a girl and had a one-day stand with him on Hawkins Island. She is a stern woman, vigorous and stimulating, with high personal and scientific standards. She is a goad to those around her, whose standards are looser, and the bane of graduate students. She is also the driving force behind the island research, for she holds memories Jake has forgotten and feels much more the urgency of their work.

The second portion is Jake's. He is a rich man's scion, a dilettante of academe, driven by Elsa and willing to be driven, yet not feeling the same urgency. We see his history, his shrewish wife, the campus chaos through his eyes, not Elsa's, for he is the more outer-directed of the two. We see too the final solution in a way that rings true and bodes well.

Both portions are heavily introspective, examining present and past in very personal terms. Yet they are also readable. We sympathize and resonate with the characters. There's no cardboard here, not even with the bit players. There's no one-dimensionality. There is plenty of satisfaction, and I feel safe in promising you that *Rose* will be a contender for both Nebula and Hugo. By no means should you miss it—even if you have to walk the roadside looking for beer cans to collect the deposits (you can do that in Maine).

Good too, but less convincing and absorbing, is Damien Broderick's **The Judas Mandala.** *Judas*'s future is a fairly standard SF scene of depressingly advanced socialism. In it there are seeds of a future dominated by godly cyborgs. There is also Maggie Roche, young poet and rebel, unemployed and chafing under the insolence she meets at the dole office. When the dole clerk invites Maggie home, she goes along, only to find herself invited into the future as well. There, she finds, she is a famous poet, but her real function is to fight the cyborg tyranny.

Need the fight be fought? One might think the cyborgs' life utopian—immortal and powerful—and their subjects hardly less well off. In case you are so inclined, Broderick shows you the end of time, when a panuniversal sentience, reminiscent of Zebrowski, has developed in two alternate modes, both potentially real, machine-based and life-based, the former completely antithetical to the latter. (Broderick has reinvented Saberhagen's Berserkers.) You then agree, as does Maggie, that the fight is right, and you cheer Maggie when she turns the key in the lock that forestalls the machines.

Broderick's characters live less vitally than Schenck's. Their postures owe more to convention, even to cliché. Yet we can see Broderick moving to-

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ward more maturity in himself and in his characters. I suspect he's a good bit younger than Schenck. He has time, then, and he may one day receive paeans greater than I have given Schenck. Unfortunately, writers rarely seem to grow as we think the years should allow. They burst upon us in near full glory, like novae, and then fade, or they glow steadily, like normal stars. Schenck is the former; he began very well, strengthened, and blazed. How long will he last? Will he get brighter yet? Or will he soon begin to fade? Broderick began less well, but still well enough, and he's improving. How far will he go? Or will he settle at a competence short of brilliance and stay there for years to come?

I could, I suppose, take a little space here to classify SF writers as stars and novae. I don't think I will. You can see the same patterns I do, in the books or in my reviews. If I tried now to state them for you, I'd only make trouble for myself. Arguments, you know. Hate mail, which I *do* hate to get. I'll content myself with saying the stellar metaphor can be extended quite aptly. Some writers are black holes, from whom no light escapes. Some are red dwarfs, dim and feeble. Some are stable long-burners, some are supergiants, red and blue-white. Some are novae, some supernovae, and some even quasars. I'll let you fill in the pigeonholes as you like.

Which pigeonhole holds Somtow Sucharitkul? For sure, he's no black hole. If his work to date hasn't made that clear, **Light on the Sound** will. The book is set in his future of a galaxy ruled by the human Inquestors, virtual immortals who believe that every utopia has a fatal flaw and send agents to find and exploit those flaws, thus ruining every would-be utopia. They have very calvinist values, regarding pain as a blessing, calling the giving of pain "compassion." They are quite capable of enslaving the Windbringers, whale-like alien sentients who sing grandly in light and sound, to serve as starships, and of breeding a deaf and blind race of humans to harvest them.

Light brings Inquestor Davaryush to Gallendys, the world of the Windbringers. He has been spoiled by exposure to a utopia with no flaw. He senses the Inquest's error. He strengthens that sense on Gallendys, with the aid of a sighted mutant escaped from the harvesters and of a peasant boy. He seeks to release the harvesters from their enslavement and the Windbringers from harvest. He fails, but he sows the seed of the Inquest's later fall and the true glory of humanity.

Sucharitkul's tales almost always have a taste of the epic, of myth and legend. The names roll roundly from the tongue. Acts have cosmic significance. Games are of life and death. In a way, he reminds of Cordwainer Smith and his Lords of the Instrumentality. He differs from Smith in his closeness to what we know—he writes of worlds and beings just far enough from our lives to feel strange, yet with echoes of a familiar past. He is a mythmaker.

David Andreissen's **Star Seed** shows us the last few mammals, a handful of humans and porpoises in an undersea experimental station. All other lung-breathers are dead of a new disease, the Red Death, that rides the air and survives in the soil. The survivors must breathe only the air they generate for themselves underwater, in isolation, and they face a near-future loss of power to generate that air. (Andreissen ignores the possibilities of filters.) As the story opens, they face a new breed of shark

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that shows ominous signs of intelligence and hunts in cooperative packs. The humans flee the station in the faint hope of finding a refuge at the source of a mysterious radio signal. On the way, they find that a new alga is adding chlorine to Earth's atmosphere, and once there they find the reason why: "terraforming" aliens, chlorine-breathers who work through genetic engineering. I tell you the gimmick because you will see it coming, and because it is a neat enough idea—humans as victims of terraformers—to deserve attention.

However, there are a couple of minor problems. Andreissen seems not to have thought out his story thoroughly enough. He tells us that the Red Death bacterium is killed by temperatures of twenty below. If that is so, then some humans should have survived in either the Arctic or the Antarctic (when it's summer in one, it's winter in the other), at least for longer than they did. By the same token, the disease should not have been able to reach the Moon colony on cargo, presumably kept in an evacuated hold at the temperature of shadow in space. By another token, his aliens should not be palatable to any Earthly life, yet at he end he has sharks gorging on alien, chlorine-based flesh.

Such things jar. They spoil our suspension of disbelief in too-easy victory and too-villainous villains. But Andreissen is a name to watch. He puts a good, fast story together, and he strings the words skillfully. He should improve.

Carolyn Cherryh gives us **Merchanter's Luck,** a sequel to *Downbelow Station* that shows us later events from the viewpoint of the merchanters (who resemble Andre Norton's ship-based trader families). The hero is Sandor Kreja, owner and sole crew of the small merchanter ship *Lucy*. He is the last survivor of his family, most of whom were killed in a pirate attack, and his existence is marginal. At Viking Station, he meets Allison Reilly, of *Dublin Again,* a big, rich ship and family. When *Dublin* leaves for Downbelow Station, he follows recklessly, gets into trouble, and is bailed out by Allison, who with her cousins becomes a crew for *Lucy*. Together they then bait a trap for pirates, who may or may not be the ones who orphaned Sandor. They emerge from crises of faith, trust, and economics to face a sunny future.

The story is typically Cherryh, readable, well worked out, fun, and well worth your money. Enjoy.

Sandra Miesel, chemist, historian, and critic, has finally produced her first novel, **Dreamrider.** It's good, too, as Gordon Dickson tells us in his introduction; it's even "literature," he says.

The hero is Ria Legarde, a researcher with an enviable university job, a woman crowded into a drab world of enforced cheeriness and sociability. She has suffered dreams since childhood. When she is nearly electrocuted by her computer terminal, she dreams the truth behind those dreams: future shamans have touched her and wish to train her for a world-saving mission, for she has the shaman's talent and she is needed. Her mentors are an aged woman, Kara, and an intelligent otter, Lute. Their world is enchanting, and as Ria explores it in trances we too see the appalling contrast with her own—and our—world.

At story's end, Ria has her training and knows what to do next, but her mission remains, promising us a sequel. I look forward to it, for Miesel is effective, evocative, skillful, and thoughtful, and she gives psi and alternate worlds a remarkably real feel.

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The New Visions showcases the artwork that has graced the covers of the Science Fiction Book Club's selections over the years. It also offers the artists' own comments on themselves and their work. We thus gain glimpses of Barr, Corben, Frazetta, Hinge, Katz, Maitz, Powers, Vallejo, Whelan, and more, totalling 23. For some reason, all are men. The best may be David K. Stone, with his covers for *The Faded Sun: Kesrith* and *TFS: Kutath*. ▣

Next month's lead story, with a cover by Jack Gaughan, is just what you need for what ails you: the first Hoka story in quite a few years, by Poul Anderson and Gordon R. Dickson. It's called "The Napoleon Crime," for perfectly good reasons which I won't elaborate on except to say that you may learn a good deal of history among the chuckles. Of course, the version you learn here may not be quite the way you learned it in school....

The rest of the issue is a highly diverse collection of fiction and fact, including the long-delayed appearance of a Robert Silverberg short story which Bob lost track of quite a few years ago and only recently rediscovered. Plus a longer story of some distinctly alien aliens by Rob Chilson, a thought-provoking guest editorial by Charles Sheffield, and a fact article on how you can get rid of gravity (locally) with principles that are already well established.

IN TIMES TO COME

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brass tacks

Dear Stan:

We are all—unless we bother to think about it—violently and immediately opposed to propaganda. Once thinking begins to take place, we do begin to see that all teaching is propaganda, and has to be: an unbiased teacher does not exist in any field I can come up with. In math classes there remains the argument between Cantor and Kronecker, for instance; in arithmetic classes the fact that 2 and 2 are 4 has no better rationale than (choice of one): "Put two of your fingers up. Now two more. Now count the fingers you have up," or: "I say so, and the book says so, and unless you give this answer on the test you will be marked wrong." Neither of these is a decent proof—such a proof requires a good deal more sophistication than is available in your average first grade. We all want to go and jump on the teacher whose rationale is: "Because I say so," and so on—again, until thought takes place. Sorry: 2 and 2 are 4 is a teachable statement because, and only because, we adults have all agreed to say so, and have a tradition going back to before Pythagoras and into the Two Kingdoms of Egypt that makes us feel comfortable in saying so. Go ask a mathematician if you need proof or demonstration for so wild and unsupported an assertion; I'm busy now with the subject of this letter.

I do, most intensely, dislike propaganda on TV—even when I think about it. I don't mean the news or public-affairs shows, because I believe that most people (as surveys appear to agree) take such stuff with somewhere near the hogshead of salt it deserves. What I do mean is the entertainment programs — from "Love, Sidney," which presents no alternate acceptable view of its homosexual hero (and I greatly respect Tony Randall as an actor; this is not a hate

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letter), but gives only the most positive, if slightly cautious, view available — from that of the "Dallas/Dynasty/General Hospital" sort of thing, which is terribly insistent on "freedom of sexual/economic/relational choice" to the point where these run wild over other freedoms we are (otherwhere) supposed to value. (Again, these shows display some fine acting and bits of decent TV writing; Tony Geary is especially remarkable on "General Hospital," and Linda Evans on "Dynasty" or one of its clones, I forget which. I do *not* want to attack the actors concerned, nor the competence and charm of some of the writing; it's the failure to make that distinction that has got the Moral Majority into such hot water as it deserves.) Much more, I dislike, and think attackable, propaganda in entertainment shows which purport either to give both sides of an issue, or to present a slice of history, without loading the dice for one side or another.

I've recently seen "A Woman Named Golda," and watched in fascination as Ingrid Bergman, Anne Jackson, Ned Beatty, and others gave the performances of their careers in a fifth-rate script—a high-school pageant, "elevated" by the language and some good photography. But when Bergman, as Golda Meir, is made to say that Israel cannot give up her gains in the Sinai or on the Golan Heights without a real guarantee of true peace, it having been made clear that the U.S. can never provide such a guarantee—and when we are given a marvel in Sadat's Jerusalem visit and address to the Knesset, to be told balefully in the last seconds of the film that "During the making of this film . . . Anwar Sadat was assassinated in Cairo," we are being pushed pretty damned hard.

I agree with the show's position. I also think that a TV drama, however factual it appears to be (and "A Woman Named Golda" did print a sort of disclaimer at the beginning of each of its two parts—but only a "sort of disclaimer") has no business passing its views off as fact, and emotionally loaded fact at that, since we are supposed to sympathize with Golda and we do.

Such shows as "M*A*S*H" and "Trapper John, M.D." are dependably propagandizing for one subject or another; in "Trapper John" especially, the worst sort of bias is given full rein, since the characters regularly spout figures and percentages and surveys to each other—when the numbers or facts are in great doubt—and the audience takes this stuff for fact, because Trapper or Gonzo says it is fact, they being the heroes. I am going to miss "Lou Grant" (though few of my favorites have lasted as long), but its recent show on the subject of nuclear freeze will modify my regret at its passing.

"Lou Grant" was an honest "Trapper John," damn it: it really did present all sides of a given issue fairly, and it left decisions mostly to its viewers — which must have caused thousands of arguments, and I am all for anything on the tube that causes arguments. But this freeze job—defined for the show as a unilateral-if-they-won't-go-along sort of freeze—gave us sensible and thoughtful and committed pro-freezers, and opposition shown only as idiotic, weird, or fairly funny (there was a series of person-in-the-street interviews, late in the show, that was a marvelous grab-bag of mania). A few samples of the show's presented-as-knowledgeable arguments:

1. "There are 50,000 nuclear warheads in the world today. We have 30,000 and the Soviets have 20,000." I've heard such figures, and sixteen

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other sets, from responsible sources. And what "nuclear warhead" means, without further statements about targeting, kilotonnage, and so on, I have no idea. I have 30 bullets and you have 20; at any distance up to, say, 25 feet, if you have a Magnum .45 and I have a .22 S&W, I'm outgunned.

2. An actor was presented in the show as an expert on EMP, the electromagnetic pulse effect of a nuclear airburst. The effect has caused much frenzy and a good deal of argument, but the expert had everything at his fingertips. He spoke lines that made it horribly clear that the writer had no idea what in hell EMP was or might be. It would disrupt all communications, the actor told me, if the air-burst hit just the right spot. God knows; this may even be true. But the right spot is known, as far as there are any ideas at all, only to God. In any case, the disruption wouldn't be because of "melting telephone wires" or any such damn thing. It might (as the actor went on) interfere massively between a missile and its ground control; and the argument has been made. The facts do not yet seem sufficient to support it as a flat statement. I think this was the expert who also talked about melting telephones, but that may have been another expert; the presentation got very earnest, but awfully confused.

Damn it, I know of no issue that has only one side (any candidates?); and if "Lou Grant" was doing this, then everybody is. "Hill Street Blues" may yet be immune, but that's about it just now. And this sort of propaganda is dangerous. People are suspicious of news. Few people suspect "Lou Grant" or "Trapper John."

Because a good many such propaganda pieces involve issues of interest and concern to *Analog* readers, who tend to be a knowledgeable bunch anyhow, I suggest that we start writing to sponsors. Some shows have their slant built in, for good or bad, I guess: "Love, Sidney" or "Diff'rent Strokes" or "Alice," for instance. Some have freedom of choice: nothing in the structure of "Trapper John" or "Nurse" or "Mork and Mindy" requires that a specific, single line be taken on a given show. I'd start with those.

And I'd be, were I you (as I am, being me), sensible enough to protest one-sided arguments whether you agree or disagree with the side presented. That entertainment, at every popular level, is now suborned into shilling for a point of view, is dangerous. Look: Ed Asner has every right to speak out on any subject whatever—on his own time, so to speak, and in his own person. As Lou Grant, or as the SAG president, he hasn't: his claim is either that he represents the massed opinion of SAG, which is ridiculous if only because no two actors have ever agreed on anything, much; or that Lou Grant speaks ex cathedra and infallibly, which would shock Hell out of the editors on the *Washington Post* or the *Chicago Tribune*.

The integrity of entertainers is valuable and easily dented. The argument here is much like one I remember in SF. An author (Alfred Bester?) said in a set of lectures on SF that, after all, people don't read the stuff for information. Very well, said another author, whose name I can't dig out of memory; but they don't read it for *misinformation* either. Get the facts straight; present them as decently as possible; and, if the issue is alive and has several sides, try to get in something from all sides, without caricature.

This is not easy (nor have I always done it). But a close approach can be made, and maybe we all ought to try for

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it a little more. The entertainer as shill is a little scary—for which see Ted Sturgeon's "The Comedian's Children," some years back, or the list of "standard attitudes" Alfred Bester presented at an SF symposium quite a while back—which is still a list of standard attitudes in SF, any month, nearly anywhere.

Well?

LAURENCE M. JANIFER

New York NY

I'd certainly hate to see any official attempt to decree that nobody be allowed *to propagandize in an entertainment show, or to* require *that all sides of an issue always be presented without bias. Sometimes a controversy can and should be neatly encapsulated in a single drama, but sometimes, on a larger scale, it's carried out by writers of opposing views pushing as hard as they can for the ones they favor in* different *pieces. But your last couple of paragraphs are certainly good advice for writers. After all, even if you* are *pushing one side, you only weaken your arguments by making the oppostion look like simpletons when there are strong, intelligent arguments which they could make—and you should answer.*

Dear Stanley:

I'm disappointed. Didn't the death of Harry Bates merit at least one sentence in *Analog*?

LEO DOROSCHENKO

West Orange NJ

Yes, the death of Harry Bates, Astounding*'s first editor and frequent contributor, merited even more than one sentence. The problem is how and when to get it in, with a lead time which is now, at* minimum, *more than five months. I've run a couple of obituaries before, and this was a problem even when the lead time was shorter. Add to that the fact that we've been losing quite a few of the old-timers in this field lately, and you have a situation in which we could be running a* lot *of obituaries, all of them several months out of date by the time they see print. I don't like letting any of these deaths (Harry Bates and George O. Smith are just two) go unmentioned, but I haven't been able to come up with a non-cumbersome way to handle them so that they aren't old news for most readers. Of course, if I'm mistaken in my impression that most readers get such news elsewhere long before they could get it here, maybe we* should *try to report all important deaths. I welcome suggestions as to how we should proceed.*

Dear Sirs:

I am writing in reference to the short story entitled "The Unfood" that appeared in your September 1982 issue. I have been reading *Analog* for a very long time, and I really am a little disturbed by one remark that was made in this story.

It states that the man writing the story, who claimed to have a PhD, was disappointed by working with laboratory techs who were not as good at coolie labor as "sharp undergraduates" . . .

I have been a laboratory technician for many many years, and I am also a freelance writer (I write a weekly column for a suburban newspaper). One of the sore points with some of us (techs) is that we run into educational snobbery much too often. I do intricate work, highly technical, and have a responsible job, and I doubt that even if I had a PhD it would help me to do my job any better than I do it. In fact I have, over the years, trained many PhDs, and some have been a disappointment to me.

At a meeting at my company, which

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employs upwards of a hundred PhDs and many other degreed people, a fresh-out-of-college kid asked if they were going to hire any more degreed people, or some more "bodies." He was warned not to make a statement like this again, and if he had not been a greenhorn he probably would have been fired.

Laboratory technicians, as you well know, do some work that is absolutely vital to this country and economy and environment. They test just about everything we eat, wear, breathe, and drink. Our high standards of pure food, drugs, waste disposal, and just about all consumer goods are maintained by exhaustive testing, almost exclusively done by lab techs. They are not, as a rule, a bunch of dimwitted stumble bums that some people have a habit of making them out to be. Some of us are even capable of an original thought or two, and some pretty significant scientific breakthroughs have been made by techs, although sometimes the degree people take credit for them. We do the work and we are right on top of the job, and we know what's happening probably better than most of the people who give the directions.

I resented that remark in the story, and I am sure the author didn't really mean it in the context I am reading it, but it rankled just the same, and I am sure it would any tech who read it.

Perhaps you could let him know my feelings, or pass this letter on to him.

I enjoy your magazine very much, and this will not prevent me from reading it, of course, when I get time off from my "coolie work"!

DALTON R. HAROLD
Schaumburg IL

And yet again *I say it: a character in a story should* not *be assumed to be intended as a representation of a whole group, and characters in stories can have opinions just as diverse as those of real people—including* wrong *opinions. I emphatically agree with most of your comments about technicians and misconceptions about them, though I hope you'll at least concede that there are bad apples among them, just as in any other group. In any case, you're welcome to borrow my soapbox to try to straighten out the perceptions of those who may need it.*

Dear Mr. Schmidt,

In your May 1982 editorial, you state that "(the) prices of goods and services should be rather closely proportional to their actual values and costs." It seems somewhat strange that the editor of a magazine of science fiction would hold a notion perilously akin to the medieval concept of a just price. The reality is that all values attached to goods and services are personal and subjective. There is no actual value of a Rembrandt painting or of a box of breakfast cereal; just different people's subjective, personal valuations, which vary with time and circumstances. Similarly, since costs are simply the values attached to that which had to be foregone in order to create the good or service, costs are subjective as well.

Your conviction that prices should be proportional to values and costs is also indicative of an unfortunately common lack of understanding of the function of prices in a market economy and of how selling prices are arrived at. The selling price of a good or service will tend toward that price at which the supply equals the demand. The selling price can be greater than, less than, or equal to the "costs" of production. The nature of the future production plans will be determined by which inequality applies.

I wholeheartedly endorse your call for personal responsibility and belief in

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principles. However, principles applied can have long-run consequences which are not desired by the holder. To predict such long-run consequences, knowledge of economics is needed. Fallacious economic ideas, firmly adhered to, can be even more dangerous than no ideas at all.

In general, science fiction authors appear to ignore economic consequences in creating societies. For example, they could well use the insights of von Mises and Hayek concerning the impossibility of economic calculation under a centrally planned economy. All too often faith in rationality and central planning results in economic collapse such as is currently happening in Poland. The prediction for centrally planned societies in science fiction is even more interesting, in light of the great weight usually given to the individual in most science fiction stories. In short, I would like to see more authors include the economic consequences as well as the technological consequences of human choices. To my mind, the Austrian School of economics, of which von Mises and Hayek are the most famous figures, is the only one to relate large-scale economic phenomena to the choices of individuals in a free society. An understanding of economics should certainly help authors to create plausible futures in the same way that an understanding of physics does.

ROBERT JACKSON

Santa Cruz CA

Trouble is, in the real world the "law of supply and demand" doesn't operate as simply as we were taught in high school—under some conditions, it can hardly be said to operate at all. Remember Rick Cook's "Brass Tacks" letter in our 3/30/81 issue? ■

STATEMENT OF OWNERSHIP, MANAGEMENT AND CIRCULATION (Required by 39 U.S.C. 3685)

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I certify that the statements made by me above are correct and complete.

LEONARD HABAS
VICE PRESIDENT OF CIRCULATION

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a calendar of analog upcoming events

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4-6 February
VIKING CON 4 (SF conference, space) at Bellingham, Wash. The usual plus Altair Cantina. Info: Viking Con 4, Science Fiction and Fantasy Club, Western Washington University, Bellingham WA 98225.

4-6 February
RA CON at Grosvenor Centre Hotel, Edinburgh, Scotland. Guest of Honour—Harry Harrison; Fan Guest of Honour—Pete Lyon. Registration—£3.50 supporting, £7 attending. Info: RA Con, 77 Baron's Ct. Terrace, Edinburgh, Scotland EH8 7EN. (Use air mail.)

18-20 February
BOSKONE XX (New England regional SF conference) at the Boston Park Plaza, Boston, Mass. Guest of Honor—Mack Reynolds; Official Artist—Wendy Pini. Costume party, art show, etc. Registration $13 in advance, $19 at the door. Info: Boskone XX, N.E.S.F.A., Box G, MIT Branch P.O., Cambridge MA 02139-910.

18-21 February
AQUACON II (SF conference) at Red Lion Inn, Ontario, Calif. Guests of Honor—Spider and Jeanne Robinson; Fan Guest of Honor—Karen Willson. Registration $17.50 until 30 November 1982, more thereafter, $5 supporting. Info: Aquacon II, P.O. Box 2011, Reseda CA 91335.

18-21 February
CONSTELLATION CON '83 (SF conference) at Empress and Harbor Tower Hotels, Victoria, B.C. Guests of Honour—Damon Knight and Kate Wilhelm; Fan Guest of Honour—Bjo Trimble; Toast Master—Jerry Pournelle. Registration—C$25. Info: Constellation Con '83 Committee, Box 15-805 Cecil Blogg Drive, Victoria B.C., Canada V9C 3H8. Not the 1983 Worldcon.

21-23 February
Office Automation Conference at Philadelphia, Penn. Info: Deborah Kalbfleisch, AFIPS, 1815 North Lynn St., Arlington VA 22209. 703-558-3617.

28 February-3 March
COMPCON Spring 83: Intellectual Leverage for the Information Society at San Francisco, Calif. Info: Frederick W. Clegg, Hewlett-Packard, 11000 Wolfe Road, Cupertino CA 95014.

1-5 September 1983
CONSTELLATION (41st World Science Fiction Convention) at Baltimore Convention Center, Baltimore, Md. Guest of Honor—John Brunner; Fan Guest of Honor—Dave Kyle; TM—Jack Chalker. Registration—$15 supporting at all times. Attending—$40 until 15 July 1983, more thereafter. This is the SF universe's annual get-together. Professionals and readers from all over the world will be in attendance. Talks, panels, films, fancy dress competition, the works. Join now and get to nominate and vote for the Hugo Awards and the John W. Campbell Award for Best New Writer. Info: Constellation, 41st World Science Fiction Convention, Box 1046, Baltimore MD 21203.

—Anthony Lewis

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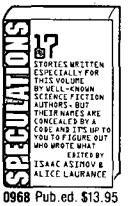
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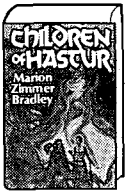

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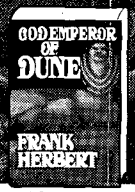

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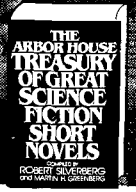

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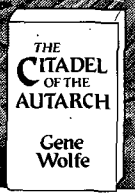

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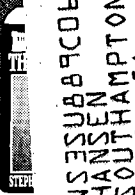

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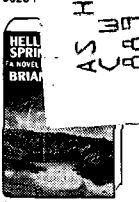

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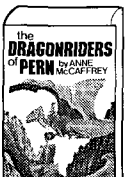

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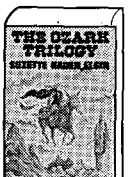

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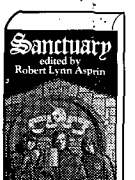

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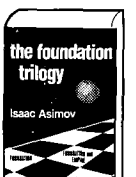

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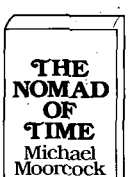

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